

**CHAPTER – 1 METALLURGY**

1. Which metal is used for extraction of Au and Ag and also for galvanization of iron object?

- a) Mg                                      b) **Zn**                                      c) Cr                                      d) Co

2. Which of the following is not a mineral of aluminium?

- a) Bauxite                                      b) Cryolite  
c) China clay                                      d) **Malachite**

3. Among the following, one does not belong to calcination. Pick the odd one out.

- a)  $\text{PbCO}_3 \xrightarrow{\Delta} \text{PbO} + \text{CO}_2$   
b)  $\text{CaCO}_3 \xrightarrow{\Delta} \text{CaO} + \text{CO}_2$   
c)  **$\text{PbSO}_3 \xrightarrow{\Delta} \text{PbO} + 2\text{SO}_2$**   
d)  $\text{ZnCO}_3 \xrightarrow{\Delta} \text{ZnO} + \text{CO}_2$

3. Name the process by which elements such as germanium, silicon and gallium are refined.

- a) Vapour phase method  
b) Electrolytic refining  
c) **Zone refining**  
d) Van-Arkel method.

4. Which of the following will give respective metal by self reduction?

- a) galena (Pbs)                                      b) HgS                                      c) ZnS                                      d) **both (a) and (b)**

5. In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with

- a) Iron sulphide (FeS)                                      b) Carbon monoxide (CO)  
c) **Copper (I) sulphide (Cu<sub>2</sub>S)**                                      d) Sulphur dioxide (SO<sub>2</sub>)

6. Which of the following mineral contains calcium as well as magnesium?

- a) Zinc blende                                      b) Aragonite                                      c) **Dolomite**                                      d) Carnalite

7. In the froth-floatation process the collectors such as pine oil and xanthates, etc enhance.

- a) Non-wettability of the mineral particles in froth  
b) **Non-wettability of the mineral particles in water**  
c) Non-wettability of the gangue particles in froth  
d) Non-wettability of the gangue particles in water.

8. Concentration of copper glance is done by

- a) leaching                                      b) magnetic separation  
c) **froth flotation**                                      d) hydraulic washing

9. Sodium, magnesium and aluminium can be obtained from their ore by

- a) **Electro metallurgy**                                      b) Pyro metallurgy                                      c) Hydro metallurgy                                      d) Smelting.

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10. Identify the halide ore among the following .

- a) Epsom salt                      b) Pyrolusite                      c) Anglesite                      **d) Rock salt**

11. The process of heating of copper pyrites to remove sulphur is called

- a) froth flotation                      **b) roasting**                      c) calcination                      d) smelting

12. Ignition mixture used in aluminothermic process is

- a)  $\text{Cr} + \text{Al}_2\text{O}_3$                       **b)  $\text{Mg} + \text{BaO}_2$**   
c)  $\text{Al} + \text{Cr}_2\text{O}_3$                       d)  $\text{Ba} + \text{MgO}$

13. Malachite has \_\_\_\_\_ composition.

- a)  $2\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$                       **b)  $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$**                       c)  $\text{Cu}_2\text{O}$                       d)  $\text{Cu}_2\text{S}$

14. Zinc blende is \_\_\_\_\_

- a)  $\text{ZnS}$**                       b)  $\text{PbS}$                       c)  $\text{Ag}_2\text{S}$                       d)  $\text{Cu}_2\text{S}$

15. In acid leaching process, the insoluble sulphide is converted into soluble sulphate and elemental \_\_\_\_\_

- a) Carbon                      b) Lead                      **c) Sulphur**                      d) Zinc

16. Sulphide ore is converted to oxide form by using the process \_\_\_\_\_

- a) Calcination                      **b) Roasting**                      c) Smelting                      d) Leaching

17. Magnetic separation it is based on the difference in the \_\_\_\_\_ of the ore and the impurities.

- a) Magnetic properties**                      b) Chemical properties  
c) Physical properties                      d) Melting point .

18. Zinc is extracted from zinc blende by \_\_\_\_\_

- a) Carbon reduction process**                      b) Nitrogen reduction process  
c) Oxygen reduction process                      d) All of these.

19. Gibb's free energy is given by \_\_\_\_\_

- a)  $\Delta G^0 = -nFE^0$**                       b)  $\Delta G^0 = nF$                       c)  $\Delta G^0 = nFE^0$                       d)  $\Delta E^0 = -nFG^0$

20.  $\text{Na}[\text{Ag}(\text{CN})_2]$  is \_\_\_\_\_.

- a) Sodium aurocyanide                      b) Sodium meta aluminate  
c) Aluminosilicate                      **d) Sodium dicyano argentate**

21. Semi conductors are purified by method \_\_\_\_\_

- a) Zone refining**                      b) Electrolytic refining  
c) Mond's process                      d) Bessemerisation

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22. Magnesite is \_\_\_\_\_

- a) magnesium oxide  
b) **magnesium carbonate**  
c) magnesium sulphate  
d) magnesium chloride

23. In the metallurgy of iron, limestone is added to coke .which acts as a \_\_\_\_\_

- a) reducing agent  
b) oxidizing agent  
c) slag  
d) **Flux.**

24. Froth flotation process is suitable for concentrating \_\_\_\_\_ ore.

- a) Oxide  
b) Carbonate  
c) **Sulphide**  
d) Halide

25. Metal oxide is converted into metal by the \_\_\_\_\_ process

- a) Calcination  
b) Roasting  
c) **Smelting**  
d) Bessemerisation .

26. Sodium cyanide solution is used to extract \_\_\_\_\_ from its ores.

- a) Copper  
b) Silver  
c) Gold  
d) **Both (b) and (c).**

27. In Hall-Herold process, \_\_\_\_\_ act as an anode.

- a) **Carbon blocks**  
b) Hydrogen  
c) Copper rods  
d) Zinc rods

28. Find the odd one out

- a) Sphalerite  
b) Galena  
c) **Azurite**  
d) Iron pyrite

29. Which is not refined by liquation?

- a) Tin  
b) **Zinc**  
c) Lead  
d) Bismuth

30. In froth floatation sodium ethyl Xanthate is used as a

- a) **Collector**  
b) depressing agent  
c) frothing agent  
d) Flux

31. Metals which do not form carbides with carbon at reduction temperature can be extracted from their oxides by

- a) Reduction by metal  
b) Reduction by hydrogen  
c) **Reduction by carbon**  
d) Auto reduction

32. If the e.m.f of the net redox reaction is positive, its  $\Delta G$  is

- a) Positive  
b) **Negative**  
c) Zero  
d) One

33. Which is used in making luminous paints, fluorescent lights and x - ray screens?

- a) Brass  
b) **Zinc sulphide**  
c) Cast iron  
d) Gold nano particles

34. Which is used for increasing the efficiency of solar cells?

- a) Brass  
b) Zinc sulphide  
c) Cast iron  
d) **Gold nanoparticles**

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**CHAPTER – 2 p BLOCK ELEMENTS I**

1. Group no 13 to 18 in the periodic table is ---elements.  
a) s block                      **b) p block**                      c) d block                      d) f block
2. -----and ----- made a revolutionary change in the field of modern electronics  
a) Si and Al                      **b) Si and Ge**                      c) Cu and Au                      d) Ag and Au
- 3.-----block elements which show only positive oxidation state  
**a) s**                      b) p                      c) d                      d) f
4. Group no 13 in the periodic table is called --  
a) Tetragens                      b) Pnictogens                      c) Chalcogens                      **d) Icosagens**
5. Group no 14 in the periodic table is called --  
**a) Tetragens**                      b) Pnictogens                      c) Chalcogens                      d) Icosagens
6. Group no 15 in the periodic table is called  
a) Tetragens                      **b) Pnictogens**                      c) Chalcogens                      d) Icosagens
7. Group no 16 in the periodic table is called --  
a) Tetragens                      b) Pnictogens                      **c) Chalcogen**                      d) Icosagens
8. Generally on descending a group the IE decreases , metallic character -----  
**a) increases**                      b) decreases                      c) no change                      d) none of these
9. Which of the following elements is / are metalloid?  
a) Arsenic, Tellurium    b) Antimony, Silicon    c) Boron, Germanium    **d) all of these**
10. Which of the following elements is/are non metals?  
a) Carbon , Nitrogen    b) Phosphorus , Oxygen    c) Sulphur and Selenium    **d) All of these**
11. Group no -----and ----- are non metals.  
a) 15,16                      b) 16,17                      **c) 17,18**                      d) 13,14
- 12.-----compound is not undergoing hydrolysis reaction  
**a) Boron trifluoride**    b) Boron trichloride    c) Boron triiodide    d) all of these
13. Which one of the following is more stable?  
a)  $Ti^{+4}$     b)  $Ti^{+3}$     **c)  $Ti^{+}$**     d)  $Ti^{+2}$
14. The Greek word ‘allos’ and ‘trope’ means ----- and -----  
a) change& another    b) different & similar    **c) another and change**    d) all of these

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15. The simplest borane is -----

- a) **Diborane**                      b) Triborane                      c) Tetra borane                      d) Mono borane

16. Halo acids have no reaction with -----

- a) **B**                                      b) C                                      c) Zn                                      d) Al

17. Oxidising acids reacts with Boron it gives

- a) Boric acid                                      b)  $H_3BO_3$                                       c)  $B(OH)_3$                                       d) **All of these**

18. ---- is essential for the cell walls of plants

- a) **B**                                      b) C                                      c) Zn                                      d) Al

19. In the manufacture of Pyrex glass,..is used.

- a) boric acid                      b) **boric oxide**                      c) sodium borate                      d) boric anhydride

20. -----is used for the identification of coloured metal ions

- a) **Borax**                      b) Boric acid                      c) Sodium borate                      d) Octahedral borax

21. When heated at red hot , Boric acid gives -----glassy mass substance

- a) boric acid                      b) boric oxide                      c) sodium borate                      d) **boric anhydride**

22. When boric acid reacted with ethyl alcohol in presence of conc.Sulphuric acid it gives ---

- a) Borax                      b) **trialkylborate**                      c) Sodium borate                      d) Octahedral borax

23. Boric acid heated with soda ash it gives -----

- a) **Borax**                      b) Boric acid                      c) Sodium borate                      d) Octahedral borax

24. -----is used as an antiseptic and as an eye lotion

- a) Borax anhydride                      b) Boric acid                      c) Sodium borate                      d) **Borax**

25. Diborane reacts with methyl alcohol to give -----

- a) Borax                      b) trialkylborate                      c) **trimethyl borate**                      d) Octahedral borax

26. Diborane adds on to alkenes and alkynes in ether solvent is called -----  
reaction

- a) Substitution                      b) addition                      c) **hydroboration**                      d) Markovnikov reaction

27. Diborane reacts with ammonia at high temperature , it gives-----

- a) Borazole                      b) Borazine                      c) Inorganic benzene                      d) **all of these**

28. 3centre and 2 electron bonds present in -----

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**+2 CHEMISTRY****SAIVEERA ACADEMY****STUDY MATERIAL**

- a) Borax anhydride                      **b) Diborane**                      c) Sodium borate                      d) Borax
29. Thermal decomposition of benzene diazonium tetrafluoro borate , it gives-----  
a) **BF<sub>3</sub>**                      b) BCl<sub>3</sub>                      c) B<sub>2</sub>H<sub>6</sub>                      d) H<sub>3</sub>BO<sub>3</sub>
30. McAfee process is for the preparation of --  
a) BF<sub>3</sub>                      **b) AlCl<sub>3</sub>**                      c) B<sub>2</sub>H<sub>6</sub>                      d) H<sub>3</sub>BO<sub>3</sub>
31. An aqueous solution of aluminium chloride is -----in nature.  
a) **acidic**                      b) basic                      c) neutral                      d) none of these
32. In solutions, -----exhibit the properties of constituent ions.  
a) Potash alum                      b) Sodium alum                      c) Ammonium alum                      **d) all of these**
33. At -----K, Potash alum is converted to Burnt alum.  
a) 495                      b) 365                      **c) 475**                      d) 500
34. -----is used for purification of water and styptic agent to arrest bleeding  
a) **Potash alum**                      b) Zinc oxide                      c) Zinc carbonate                      d) Borax
35. -----is soft and conducts electricity with hexagonal net of sp<sup>2</sup> hybridisation of Carbon allotrope  
a) Diamond                      b) Fullerenes                      c) Graphene                      **d) Graphite**
36. -----is hard and not conducts electricity with tetrahedral net of sp<sup>3</sup> hybridisation of Carbon allotrope  
a) **Diamond**                      b) Fullerenes                      c) Graphene                      d) Graphite
37. -----have graphite like tubes with fullerene ends and stronger than steel.  
a) Diamond                      **b) Carbon nanotubes**                      c) Graphene                      d) Graphite
38. The mixture of carbon monoxide and nitrogen is called -----  
a) water gas                      **b) producer gas**                      c) both a and b                      d) none of these
39. Methanoic acid react with sulphuric acid , it gives -----  
a) BF<sub>3</sub>                      b) CO<sub>2</sub>                      c) B<sub>2</sub>H<sub>6</sub>                      **d) CO**
40. CO reacts with chlorine , it gives -----  
a) carbonyl chloride                      b) Phosgene                      **c) both a and b**                      d) none of these
41. At high temperature and pressure a mixture of CO and Hydrogen gives-----

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a) ethyl alcohol                      b) propanol                      c) **methyl alcohol**                      d) 2 butanol

42. Ethene is mixed with CO and Hydrogen gas to produce propanal . This is called----- process.

a) McAfee process                      **b) Oxo process**                      c) Syn process                      d) Liquefaction process

43. In Nickel tetracarbonyl , Iron pentacarbonyl and Chromium hexacarbonyl the oxidation state of transition metal is -----

**a) zero**                      b) one                      c) two                      d) three

44. The critical temperature of Carbon dioxide is -----°C

a) 51                      b) 45                      c) 35                      **d) 31**

45. Olivine is an example for -----type of silicates.

a) Ortho silicates                      b) Neso silicates                      **c) both a and b**                      d) Ino silicates

46. Beryl is an example for -----type of silicates

a) inosilicates                      b) chain silicates                      c) amphiboles                      **d) cyclic silicates**

47. Spodumene is an example for -----type of silicates

a) inosilicates                      **b) chain silicates**                      c) amphiboles                      d) cyclic silicates

48. Asbestos is an example for -----type of silicates

a) inosilicates                      b) chain silicates                      **c) amphiboles**                      d) cyclic silicates

49. Talc, Mica are the example for -----type of silicates

**a) Phyllo silicates**                      b) chain silicates                      c) amphiboles                      d) cyclic silicates

50. Quartz is an example for -----type of silicates

a) inosilicates                      **b) tecto silicates**                      c) amphiboles                      d) cyclic silicates

51. ----- act as a molecular sieve for the removal of permanent hardness of water

a) Inosilicates                      b) Tecto silicates                      c) Amphiboles                      **d) Zeolites**

52. Group 18 elements are inert because of their

a) unstable incompletely filled orbitals                      **b) stable completely filled orbitals**  
c) half filled orbitals                      d) stable nucleus

53. The most reactive element among halogens is

**a) Fluorine**                      b) Chlorine                      c) Bromine                      d) Iodine

54. The formula of colemanite is

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**+2 CHEMISTRY****SAIVEERA ACADEMY****STUDY MATERIAL**a)  $\text{Na}_2\text{B}_4\text{O}_7$ b)  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ c)  $\text{Ca}_2\text{B}_6\text{O}_{11}$ d)  $\text{NaBO}_2$ 

55. The compound used in eye drops and antiseptics is

a) boron nitride

b) **boric acid**

c) sodium meta borate

d) boron tri oxide

56. The most stable form of allotropes of carbon is

a) **graphite**

b) diamond

c) fullerene

d) carbon nano tubes

57. In the presence of light carbon monoxide reacts with chlorine to form a poisonous gas called

a) mustard gas

b) **phosgene**

c) phosphine

d) carbylamine

MKS TAMIL FRIENDS

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**Unit – 3 p BLOCK ELEMENTS - II**

1. Which of the following is correct?

- a)  $\text{H}_3\text{PO}_3$  is dibasic and reducing  
b)  $\text{H}_3\text{PO}_3$  is dibasic and non reducing  
c)  $\text{H}_3\text{PO}_3$  is tribasic and reducing  
d)  $\text{H}_3\text{PO}_3$  is tribasic and non reducing.

2. Catenation property of group 15 elements follow the order?

- a)  $\text{N} < \text{P} < \text{As} < \text{Sb} < \text{Bi}$   
b)  $\text{P} \gg \text{N} > \text{As} > \text{Sb} > \text{Bi}$   
c)  $\text{P} < \text{N} < \text{As} < \text{Sb} < \text{Bi}$   
d)  $\text{N} \gg \text{P} > \text{As} > \text{Sb} > \text{Bi}$

3. Which of the following halides of group 15 is not hydrolysed?

- a)  $\text{NF}_3$                       b)  $\text{PF}_3$                       c)  $\text{NI}_3$                       d) both (a) and (b)

4. Which is diacidic?

- a) Orthophosphoric acid                      b) Pyrophosphoric acid  
c) Orthophosphorous acid                      d) Hypophosphorous acid

5. The hybridisation and shape of  $\text{SF}_6$  is respectively?

- a)  $\text{Sp}^3\text{d}^2$ , square planar                      b)  $\text{Sp}^3\text{d}^2$ , octahedral  
c)  $\text{Sp}^3\text{d}$ , see-saw                      d)  $\text{Sp}^3\text{d}$ , trigonal bipyramidal

6. Allotrope of sulphur which shows paramagnetic behaviour

- a)  $\text{S}_8$  – Rhombic                      b)  $\text{S}_8$  - Monoclinic  
c)  $\text{S}_2$ - in vapour phase                      d) Not possible

7. S-S bond is present in

- a)  $\text{H}_2\text{S}_2\text{O}_7$                       b)  $\text{H}_2\text{SO}_5$                       c)  $\text{H}_2\text{S}_2\text{O}_8$                       d)  $\text{H}_2\text{S}_2\text{O}_6$

8. Pick the wrong one among the following

- a)  $\text{F}_2$  – yellow                      b)  $\text{Br}_2$  – red                      c)  $\text{Cl}_2$  – colourless                      d)  $\text{I}_2$  – violet

9. Hot concentrated  $\text{H}_2\text{SO}_4$  is moderately strong oxidising agent which of the following reactions does not show oxidising behaviour ?

- a)  $\text{Cu} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{SO}_2 + 2\text{H}_2\text{O}$   
b)  $3\text{S} + 2\text{H}_2\text{SO}_4 \rightarrow 3\text{SO}_2 + 2\text{H}_2\text{O}$   
c)  $\text{C} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + 2\text{SO}_2 + 2\text{H}_2\text{O}$   
d)  $\text{CaF}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2\text{HF}$

10. When copper is heated with conc.  $\text{HNO}_3$  it produces

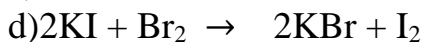
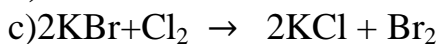
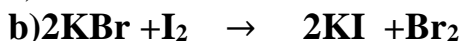
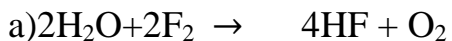
- a)  $\text{Cu}(\text{NO}_3)_2$  and  $\text{N}_2\text{O}$                       b)  $\text{Cu}(\text{NO}_3)_2$  and  $\text{NO}_2$   
c)  $\text{Cu}(\text{NO}_3)_2$  and  $\text{NO}$                       d)  $\text{Cu}(\text{NO}_3)_2$ ,  $\text{NO}$  and  $\text{N}_2\text{O}$

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a)Ammonium sulphates    b)Superphosphate of lime    c)Urea    d)Potassium nitrate

18. Which reaction is not feasible \_\_\_\_\_



19. Oxidation states of P in  $\text{H}_4\text{P}_2\text{O}_5$ ,  $\text{H}_4\text{P}_2\text{O}_6$ ,  $\text{H}_4\text{P}_2\text{O}_7$  are respectively \_\_\_\_\_

a) +3,+4,+5

b) +3,+5,+4

c) +5,+3,+4

d) +5,+4,+3

20. The ionisation energy of Ga is higher than that of Al because of \_\_\_\_\_

a) More effective nuclear charge of Ga

b) Smaller atomic size of Ga

c) Larger size of Ga

d) Both (a) and (b)

21. Helium is used in balloons in the place of hydrogen because it is \_\_\_\_\_

a) Incombustible

b) Radioactive and detected easily

c) Lighter than hydrogen

d) Both (a) and (c)

22. The high reactivity of fluorine is due to \_\_\_\_\_

a) High ionisation energy

b) Low bond dissociation energy

c) Low electron affinity

d) High electronegativity .

23. Chile salt petre is

a.  $\text{NaNO}_2$

b.  $\text{NaNO}_3$

c.  $\text{KNO}_2$

d.  $\text{KNO}_3$

24. The substance used in cryosurgery for producing low temperature is

a. liquid oxygen

b. liquid nitrogen

c. liquid hydrogen

d. liquid ammonia

25. The process used for the manufacture of nitric acid is known as

a. Haber's process

b. Deacon's process

c).contact process

d. Ostwald's process

26. With excess of chlorine, ammonia reacts to give an explosive substance

a.  $\text{N}_2$

b.  $\text{NH}_4\text{NO}_3$

c.  $\text{NH}_4\text{Cl}$

d.  $\text{NCl}_3$

27. The shape of ammonia molecule is

a. tetrahedral

b. pyramidal

c. square planar

d. octahedral

28. The bond angle in ammonia is

a.  $104^\circ$

b.  $104^\circ 28'$

c.  $107^\circ$

d.  $180^\circ$

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29. Nitric acid can act as

- a. an acid      b. an oxidising agent      c. nitrating agent      **d. all of the above**

30. Which is used in match boxes?

- a. White phosphorous      **b. Red phosphorous**      c. Black phosphorous      d. Scarlet phosphorous

31. The smell of phosphine is

- a. rotten egg      **b. rotten fish**      c. pungent      d. garlic

32. Thermodynamically stable allotropic form of sulphur is

- a. Rhombic sulphur**      b. Monoclinic sulphur  
c. Plastic sulphur      d. Colloidal sulphur

33. The halogen which exists as a liquid is

- a. fluorine      b. chlorine      **c. bromine**      d. iodine

34. Chlorine is manufactured by

- a. Haber's process      **b. Deacon's process**      c. Contact process      d. Ostwald's process

35. **Aquaregia is a mixture of conc. HCl and conc. HNO<sub>3</sub> in the ratio**

- a. 1 : 3      **b. 3 : 1**      c. 2 : 3      d. 3 : 2

36. The correct order of acid strength is

- a. HF > HCl > HBr > HI      **b. HF < HCl < HBr < HI**  
c. HF > HCl < HBr > HI      d. HF < HCl > HBr < HI

37. The first ionisation energy of noble gases is in the order

- a. He < Ne < Ar < Kr      **b. He > Ne > Ar > Kr**  
c. He < Ne > Ar < Kr      d. He > Ne < Ar > Kr

38. Hydrolysis of urea gives

- a) ammonia**      b) liquid nitrogen      c) nitrous oxide      d) nitric oxide

39. Hybridization of phosphine is

- a) sp      b) sp<sup>2</sup>      **c) sp<sup>3</sup>**      d) dsp<sup>2</sup>

40. Shape of Phosphine is

- a) pyramidal      b) layered      c) trigonal planar      d) tetrahedral

41. \_\_\_\_\_ is used to produce smoke screen

- a) PH<sub>3</sub>**      b) H<sub>3</sub>PO<sub>3</sub>      c) P<sub>2</sub>O<sub>3</sub>      d) H<sub>3</sub>PO<sub>3</sub>

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**Unit – 4 TRANSITION AND INNER TRANSITION ELEMENTS**

1. The catalytic activity of transition metals is due to \_\_\_\_\_
- The formation of variety of oxidation states
  - The formation of intermediate products
  - The capability of forming interstitial compounds
  - All the above.**
2. Most of the transition metal ions are coloured, because of the \_\_\_\_\_
- Presence of unpaired electrons
  - Energy gap between two energy levels is very small.
  - Both (a) and (b)**
  - Neither (a) nor (b)
3. Which of the following is wrong with respect to lanthanide contraction?
- Decrease in ionic radii
  - Increase in tendency to act as reducing agent.**
  - Decrease in basic character.
  - Resembles second and third row of d-block elements.
4. Hybridisation of chromium ions and dichromate ions is \_\_\_\_\_
- $sp^1$
  - $sp^3d$**
  - both (a) and (b)
  - none of these .
5. The highest possible oxidation state shown by osmium in its compound is \_\_\_\_\_
- +4
  - +6
  - +8**
  - +10
6. Identify the paramagnetic species
- $Cu^+$
  - $Cr^+$**
  - $MnO_4$
  - $Zn^{2+}$
7. The trend in ionization enthalpy of a transition element is not regular because,
- removal of one electron alters the relation energies of 4s and 3d orbitals.**
  - due to different electronic configuration (stability)
  - poor screening of 3p-orbitals
  - due to decrease in effective nuclear charge
8. Oxygen stabilizes higher oxidation state because
- it is electronegative
  - of its tendency to form multiple bond**
  - of large size
  - of small size
9. Which one of the following exhibits highest oxidation state?
- Ni
  - Mn**
  - V
  - Zr
10. Ce(Z=58) and Yb (Z=70) Exhibits stable +1 and +2 oxidation states respectively. This is because

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- a)  $\text{Ce}^{4+}$  and  $\text{Yb}^{2+}$  acquire  $f^7$  configuration  
b)  $\text{Ce}^{4+}$  and  $\text{Yb}^{2+}$  acquire  $f^0$  configuration  
c)  $\text{Ce}^{4+}$  and  $\text{Yb}^{2+}$  acquire  $f^7$  and  $f^{14}$  configuration  
d)  **$\text{Ce}^{4+}$  and  $\text{Yb}^{2+}$  acquire  $f^0$  and  $f^{14}$  configuration.**

11. Which of the following is coloured due to charge transfer?

- a)  $\text{MnO}_4^-$                       b)  $\text{CrO}_4^{2-}$                       c)  $\text{Cu}_2\text{O}$                       d) **all of these**

12. The lanthanide contraction is responsible for the fact that

- a) Zr and Zn have the same oxidation state  
b) **Zr and Hf have almost the same radius**  
c) Zr and Nb have similar oxidation state  
d) Zr and Y have similar radius

13. Which of the following is not coloured ?

- a)  $\text{Mn}^{2+}$                       b)  **$\text{Zn}^{2+}$**                       c)  $\text{Cr}^{3+}$                       d)  $\text{Cu}^{2+}$

14. The correct statement is,

- a)  $\text{Cu}_2\text{Cl}_2$  and  $\text{Ag}_2\text{S}$  are coloured  
b) **upon strong heating paramagnetic gases are evolved by  $\text{NaNO}_3$  and  $\text{AgNO}_3$**   
c) green vitriol and blue vitriol are isomorphous  
d)  $\text{KMnO}_4$  and  $\text{K}_2\text{Cr}_2\text{O}_7$  are coloured due to d-d transitions.

15. Which of the following statements is correct for 3d-transition element?

- a) all metals except Zn and Sc form 'MO' oxide  
b) **all metals except Sc forms 'MO' oxide**  
c) all metals except Zn forms 'MO' oxide  
d) all metals except Mn forms 'MO' oxide

16. The colour of  $\text{K}_2\text{Cr}_2\text{O}_7$  and  $\text{Fe}^{2+}$  ions are respectively due to

- a) crystal defects and charge transfer spectra  
b) d-d transition and charge transfer spectra  
c) charge transfer spectra and crystal defects  
d) **charge transfer spectra and d-d transition.**

17.  $\text{CrO}_3$  is coloured due to

- a) low I.E                      b) crystal defects                      c) **charge transfer spectra**                      d) unpaired electron

18. The reaction of aqueous  $\text{KMnO}_4$  with  $\text{H}_2\text{O}_2$  in acidic condition gives

- a)  $\text{Mn}^{4+}$  and  $\text{MnO}_2$                       b)  $\text{Mn}^{4+}$  and  $\text{O}_2$   
c)  **$\text{Mn}^{2+}$  and  $\text{O}_2$**                       d)  $\text{Mn}^{3+}$  and  $\text{O}_2$

19. Identify the correct reason for lanthanide contraction

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- a) decreasing nuclear charge  
c) increasing nuclear charge
- b) decreasing screening effect  
d) negligible screening effect
20. Which of the following ions will exhibit colour in aqueous solutions?  
a)  $\text{Sc}^{3+}$  (Z=21)                      b)  $\text{Ti}^{3+}$  (Z=22)                      c)  $\text{La}^{3+}$  (Z=57)                      d)  $\text{Lu}^{3+}$  (Z=71)
21. On oxidation with  $\text{KMnO}_4$  in acidic medium,  $\text{SO}_2$  is oxidised to \_\_\_\_\_  
a)  $\text{SO}_2$                                       b)  $\text{H}_2\text{SO}_4$                                       c)  $\text{SO}_3^{2-}$                                       d)  $\text{H}_2\text{S}$
22. Value of magnetic moment of a divalent metal ion is 5.92 BM. Total number of electron in its atom would be \_\_\_\_\_  
a) 24    b) 25    c) 26    d) 27
23. The electronic configuration of Sc is \_\_\_\_\_  
a)  $[\text{Ar}]3d^14s^2$                                       b)  $[\text{Ar}]3d^24s^1$                                       c)  $[\text{Ar}]3d^54s^1$                                       d)  $[\text{Ar}]3d^34s^1$
24. The general electronic configuration of d-block elements can be written as \_\_\_\_\_  
a) [Noble gas]  $n-1d^{1-10}ns^{1-2}$   
b) [Noble gas]  $n-1d^{1-10}np^{1-6}$   
c) [Noble gas]  $n-2d^{10}ns^{1-2}$   
d) [Noble gas]  $n-2d^{10}ns^{1-6}$
25. If the standard electrode potential ( $E^\circ$ ) of a metal is \_\_\_\_\_ and \_\_\_\_\_ the metal is a powerful reducing agent.  
a) Large, negative                                      b) Large, positive  
c) Small, negative                                      d) Small, positive.
26. In chromyl chloride test, A \_\_\_\_\_ precipitate of lead chromate is obtained.  
a) White    b) Red    c) Yellow    d) Blue
27. Equivalent weight of  $\text{KMnO}_4$  in acidic medium is \_\_\_\_\_  
a) 3.16    b) 31.6    c) 158    d) 52.67
28. The general electronic configuration of 4f series of the elements can be written as \_\_\_\_\_  
a)  $[\text{Xe}] 4f^{2-14}5d^{0-4} 6s^2$   
b)  $[\text{Xe}] 4f^{2-14}5d^{0-4} 6s^1$   
c)  $[\text{Xe}] 4f^{1-14}5d^0 6s^1$   
d)  $[\text{Xe}] 4f^{2-14}5d^{0-4} 6s^1$
29. The common oxidation state for lanthanides is \_\_\_\_\_  
a) +3    b) -3    c) 0    d) +2
30. The element corresponding to the electronic configuration  $[\text{Rn}]5f^36d^17s^2$  is \_\_\_\_\_  
a) neptunium    b) plutonium    c) uranium    d) americium

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31. \_\_\_\_\_ is known as Bayer's reagent.

- a) Hot dilute alkaline  $\text{KMnO}_4$                       b) **Cold dilute alkaline  $\text{KMnO}_4$**   
c) Hot conc. Acidic  $\text{KMnO}_4$                       d) Cold conc. Acidic  $\text{KMnO}_4$

32. A mixture of  $\text{TiCl}_4$  and trialkyl aluminium is \_\_\_\_\_

- a) Hydroformylation of obfine.                      b) **Zeigler-Natta catalyst**  
c) Interstitial compounds                      d) Ferromagnetic

33. The transition metal present in vitamin  $\text{B}_{12}$  is

- a) Fe                      b) **Co**                      c) Ni                      d) Na

34. Transition elements that show anomalous electronic configuration in first series are.

- a) Cr and Ni                      b) Cu and Co                      c) Fe and Ni                      d) **Cr and Cu**

35. The lanthanoids contraction is responsible for the fact that

- a) Zr and Y have the same radius  
b) Zr and Nb have similar oxidation state  
c) **Zr and Hf have almost the same radius**  
d) Zr and Zn have same oxidation state

36. Which of the following forms colourless compound?

- a)  **$\text{Sc}^{3+}$**                       b)  $\text{V}^{3+}$                       c)  $\text{Ti}^{3+}$                       d)  $\text{Cr}^{3+}$

37. The colour of  $\text{UO}_2^{2+}$  is

- a) red                      b) green                      c) **yellow**                      d) pink

38. The reagent used for detecting unsaturation

- a) **Bayer's reagent**                      b) Tollen's reagent  
c) Fenton's reagent                      d) Schiff's reagent

39. The colour of lead chromate obtained in chromyl chloride test

- a) Red orange                      b) **Yellow**                      c) Pink                      d) Pale blue

40. The chemical formula for pyrolusite

- a)  $\text{KMnO}_4$                       b)  $\text{K}_2\text{MnO}_4$                       c)  **$\text{MnO}_2$**                       d)  $\text{K}_2\text{Cr}_2\text{O}_7$

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**+2 CHEMISTRY****SAIVEERA ACADEMY****STUDY MATERIAL**

a)  $K_4[Fe(CN)_6]$       b)  $[Co(en)_3]Cl$       c)  $[Fe(H_2O)_6]Cl_3$       d)  $[Cu(NH_3)_4]Cl_2$

23. The oxidation number of nickel in the complex ion,  $[NiCl_4]^{2-}$  is

a) +1      b) -1      c) +2      d) -2

24. Which is not an anionic complex?

a)  $[Cu(NH_3)_4]Cl_2$       b)  $K_4[Fe(CN)_6]$       c)  $K_3[Fe(CN)_6]$       d)  $[NiCl_4]^{2-}$

25.  $[FeF_6]^{4-}$  is paramagnetic because

a)  $F^-$  is a weaker ligand      b)  $F^-$  is a strong ligand  
c)  $F^-$  is an ambidentate ligand      d)  $F^-$  is a chelating ligand

26. In  $[Fe^{II}(CN)_6]^{4-}$ , the central metal ion is

a) Fe      b)  $Fe^{+2}$       c)  $Fe^{+3}$       d)  $CN^-$

27. The type of isomerism found in the complexes  $[Co(NO_2)(NH_3)_5]SO_4$  and  $[Co(SO_4)(NH_3)_5]NO_2$

a) Hydrate isomerism      b) Coordination isomerism  
c) Linkage isomerism      d) **Ionization**

28. Which of the following is wrong about double salts?

a) Retain their properties only in solid state  
b) Contains two or more salt in stoichiometric proportions  
c) **They don't dissociate into its constituent ions**  
d) None of the above

29. Werners's theory was not able to explain \_\_\_\_ of coordination compounds.

a) Colour      b) magnetic properties  
c) **both (a) and (b)**      d) neither (a) nor (b)

30.  $[Ni(CO)_4]$  is a \_\_\_\_\_ complex.

a) anionic      b) cationic      c) **neutral**      d) ambidentate

31. \_\_\_\_\_ is used as an antitumor drug in cancer treatment.

a) Ca-EDTA      b) **Cis-platin**      c) Sodium thio sulphate      d) Nickel chloride

32. Phthalocyanine blue – a bright blue pigment is a complex of \_\_\_\_\_.

a) Copper(I) ion      b) **Copper(II) ion**      c) Nickel (II) ion      d) Nickel(IV) ion.

33. Crystal field stabilization energy for high  $d^4$  octahedral complex is \_\_\_\_\_.

a)  **$-0.6\Delta_0$**       b)  $-1.8\Delta_0$       c)  $-1.6\Delta_0$       d)  $-1.4\Delta_0$

34. Magnetic moment is given by the formula \_\_\_\_\_

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a)  $\sqrt{n(n+1)}$

b)  $\sqrt{n(n+2)}$

c)  $\sqrt{n+2}$

d)  $\sqrt{n^2 + (n+2)}$

35. The compound act as oxygen transporter of human

a) **Haemoglobin**

b) cobalt

c) Chlorophyll

d) Cyanocobalamin

36. The geometry and hybridization of  $[\text{Fe}(\text{CO})_5]$

a) Trigonal planar,  $\text{dsp}^3$ b) octahedral,  $\text{dsp}^2$ c) **Trigonal Bipyramidal,  $\text{dsp}^3$** d) Octahedral,  $\text{dsp}^2$ 

37. According to crystal field theory, the bond between ligand and central metal atom is

a) **Purely ionic**

b) purely covalent

c) Coordinate

d) none of these

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**Unit – 6 SOLID STATE**

1. An example for metal deficiency defect is  
a) NaCl                      b) AgCl                      c) **FeO**                      d) CsCl
2. An ion leaves its regular site and occupies a position in the space between the lattice sites. This defect is called as  
a) Schottky defect                      **b) Frenkel defect**                      c) impurity defect                      d) vacancy defect
3. In a simple cubic cell, each point on a corner is shared by  
a) one unit cell                      b) two unit cells                      **c) eight unit cells**                      d) four unit cells
4. In Bragg's equation 'n' represent  
a) number of moles                      b) Avogadro number                      c) quantum number                      **d) order of reflection**
5. The Bragg's equation is  
a)  $\lambda = 2d \sin\theta$                       b)  $nd = 2 \lambda \sin\theta$                       c)  $2 \lambda = nd \sin\theta$                       **d)  $n \lambda = 2d \sin \theta$**
6. The co-ordination number of ZnS is  
a) 3                      **b) 4**                      c) 6                      d) 8
7. The co-ordination number of B<sub>2</sub>O<sub>3</sub> is  
**a) 3**                      b) 4                      c) 6                      d) 8
8. The co-ordination number of NaCl is  
a) 3                      b) 4                      **c) 6**                      d) 8
9. The co-ordination number of CsCl is  
a) 3                      b) 4                      c) 6                      **d) 8**
10. The crystal structure of CsCl is  
a) simple cube                      b) face-centred cube                      **c) body-centred cube**                      d) edge-centred cube
11. A regular three dimensional arrangement of identical points in space is called  
**a) Unit cell**                      b) Space lattice                      c) Primitive                      d) Crystallography
12. An example for Frenkel defect is  
a) NaCl                      **b) AgBr**                      c) CsCl                      d) FeS
13. The solids which are good conductors of electricity and heat are  
a) Ionic solids                      b) Molecular solids                      **c) Metallic solids**                      d) Covalent solids
14. The solid in which its constituents have an orderly arrangement extending over a long range  
a) Ionic solid                      b) Molecular solids                      **c) Crystalline solids**                      d) Amorphous solids
15. The Coordination number of each atom in Simple Cubic , Face centered cubic , Body centered cubic are  
**a) 6 , 2 , 8**                      b) 2 , 6 , 8                      c) 2 , 6 , 2                      d) 6 , 2 , 6
16. Percentage of Schottky defect in VO( Vanadium Mono oxide ) crystal :  
**a) 14 %**                      b) 15%                      c) 16%                      d) 18%
17. Which one is Non Stoichiometric defect ;  
a) Metal excess effect                      b) Frenkel defect  
c) Metal deficiency defect                      d) Both a and c

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18. Percentage of free space ( vacant ) in Simple cubic , Body centered , Face centered cubic unit cell ( Cubic close packing ) are

- a) **47.69 % , 32 % , 26 %**                      b) 47.69 % , 30 % , 26 %  
c) 48.69 % , 32 % , 26 %                      d) 47.69 % , 32 % , 28 %

19. In AAA type each sphere is arranged in contact with ----- of its neighbours

- a)six                                      **b)four**                                      c)two                                      d)none of these

20. In ABAB... type each sphere is arranged in contact with ----- of its neighbours

- a)six**                                      b)four                                      c)two                                      d)none of these

21. Three atoms P , Q , R crystallize in a cubic solid lattice having P atoms at corners , Q atom at body centre , R atom at face centre . Identify the formula of the compound

- a)PQR                                      b)PQR<sub>2</sub>                                      c)PQ<sub>2</sub>R                                      **d)PQR<sub>3</sub>**

### Fillups

1. Example for Non polar molecular solid ; **Napthalene , Anthracene**
2. Example for polar molecular solid ; **Solid CO<sub>2</sub> , Solid NH<sub>3</sub>**
3. Example for Hydrogen bonded molecular solid ; **Solid ice , glucose , urea**
4. Example for Metallic solid ; **Cu , Fe , Zn , Ag , Au , Cu-Zn**
5. Two types of unit cells ; **Primitive & non primitive**
6. No of atoms in a **simple cubic** unit cell = **1**
7. No of atoms in a **body centered** cubic unit cell = **2**
8. No of atoms in a **Face centered** cubic unit cell = **4**
9. The structural units of ionic crystal are **cations and anions**
10. Ionic solid act as **conductor** in molten state **insulator** in solid state
11. In covalent solids atoms held by **covalent bonds**
12. Covalent crystal are **poor thermal and electrical conductors**
13. Molecular solids **cannot conduct electricity**

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## Unit – 7 CHEMICAL KINETICS

1.  $2\text{N}_2\text{O}_5 \longrightarrow \text{NO}_2 + \text{O}_2$ ,  $\frac{d[\text{N}_2\text{O}_5]}{dt} = k_1[\text{N}_2\text{O}_5]$ ,  $\frac{d[\text{NO}_2]}{dt} = k_2[\text{N}_2\text{O}_5]$  and  $\frac{d[\text{O}_2]}{dt} = k_3[\text{N}_2\text{O}_5]$ , the

relation between  $k_1, k_2$ , and  $k_3$  is

- a)  $2k_1 = 4k_2 = k_3$       b)  $k_1 = k_2 = k_3$       c)  $2k_1 = k_2 = 4k_3$       d)  $2k_1 = k_2 = k_3$

2. What would be the rate of disappearance of oxygen, if the rate of formation of nitric oxide (NO) is  $3.6 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$  ?

- a)  $4 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$       b)  $4 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$   
 c)  $4.5 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$       d)  $4.5 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$

Formula:  $\frac{-1}{5} \frac{\Delta[\text{O}_2]}{\Delta t} = \frac{1}{4} \frac{\Delta[\text{NO}]}{\Delta t}$

3. For a reaction,  $2\text{A} + \text{B} \rightarrow 3\text{C}$ , the rate of appearance of C at time 't' is  $1.2 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ . Identify the rate of reaction.

- a)  $4 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}$       b)  $4.5 \times 10^{-1} \text{ mol L}^{-1} \text{ s}^{-1}$   
 c)  $3.6 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$       d) None of these.

Formula:  $\frac{1}{3} \frac{d[\text{C}]}{dt} = \frac{1}{3} \times 1.2 \times 10^{-4}$

4. For the reaction,  $2\text{N}_2\text{O}_5 \rightarrow 4\text{NO}_2 + \text{O}_2$ , select the correct statement.

- a) Rate of the formation of  $\text{O}_2$  is same as rate of formation of  $\text{NO}_2$   
 b) Rate of disappearance of  $\text{N}_2\text{O}_5$  is two times the rate of formation of  $\text{NO}_2$ .  
 c) Rate of formation of  $\text{O}_2$  is 0.5 times rate of disappearance of  $\text{N}_2\text{O}_5$ .  
 d) Rate of formation of  $\text{NO}_2$  is equal to rate of disappearance of  $\text{N}_2\text{O}_5$ .

5. What would be the activation energy of the reaction when the temperature is increased from  $27^\circ\text{C}$  to  $37^\circ\text{C}$ ?

- a)  $534 \text{ kJ mol}^{-1}$       b)  $53.4 \text{ kJ mol}^{-1}$   
 c)  $5.34 \text{ kJ mol}^{-1}$       d) none of these.

Formula : rate of reaction is doubled

$$\ln \frac{k_2}{k_1} = \frac{E_a}{R} \left[ \frac{T_2 - T_1}{T_1 T_2} \right]$$

6. The unit of rate constant and rate of reaction are the same for

- a) First order      b) Second order      c) Third order      d) Zero order

7. Which of the following state is not correct ?

- a) Molecularity of a reaction cannot be fractional  
 b) Molecularity of a reaction cannot be more than three  
 c) Molecularity of a reaction can be zero  
 d) Molecularity is assigned for each elementary step of mechanism.

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8. The addition of a catalyst during a chemical reaction alters which of the following quantities?

- a) **Activation energy**      b) Entropy      c) Internal energy      d) Enthalpy .

9. What will be the rate constant of a I order reaction ,if its half life is given to be 20 min?

- a)  $13.86 \text{ min}^{-1}$       b)  $28.86 \text{ min}^{-1}$       c)  **$3.47 \times 10^{-2} \text{ min}^{-1}$**       d) none of these

**Formula :**  $\frac{0.693}{t_{\frac{1}{2}}}$

10. How much time will be taken for 20 gm to reduce 5 g? [ $R = 2 \times 10^{-3} \text{ s}^{-1}$  (I order reaction)].

- a) **693.1 s**      b)  $693.1 \text{ s}^{-1}$       c) 6.931 s      d)  $6.931 \text{ s}^{-1}$

**Formula:**  $t = \frac{2.303}{R} \log \frac{[A_0]}{[A_t]}$

11. A first order reaction is 50% completed in  $1.26 \times 10^{14}$ . how much time would it take for 100% completion?

- a)  $1.26 \times 10^{15} \text{ s}$       b)  $2.52 \times 10^{14} \text{ s}$       c)  $2.52 \times 10^{28} \text{ s}$       d) **Infinite**

12. For the second order reaction  $t_{\frac{1}{2}} \propto$

- a)  $\frac{1}{a^2}$       b)  $\frac{1}{a}$       c) *constant*      d) *a*

13. The unit of zero order rate constant is

- a)  $\text{litre mol}^{-1} \text{ sec}^{-1}$       b)  **$\text{mol litre}^{-1} \text{ sec}^{-1}$**       c)  $\text{sec}^{-1}$       d)  $\text{litre}^2 \text{ sec}^{-1}$ .

14. The excess energy which a molecule must possess to become active is known as

- a) Kinetic energy      b) Threshold energy      c) Potential energy      d) **Activation energy**

15. Arrhenius equation is

- a)  $k = A e^{-1/RT}$       b)  $k = A e^{RT/E_a}$       c)  **$k = A e^{-E_a/RT}$**       d)  $k = A e^{E_a/RT}$

16. The term A in Arrhenius equation is called as

- a) Probability factor      b) Activation energy      c) Collision factor      d) **Frequency factor**

17. The half life period of a first order reaction is 10 minute. then its rate constant is

- $6.93 \times 10^2 \text{ min}^{-1}$       b)  $0.693 \times 10^{-2} \text{ min}^{-1}$   
c)  **$6.932 \times 10^{-2} \text{ min}^{-1}$**       d)  $69.3 \times 10^{-1} \text{ min}^{-1}$

18. If the initial concentration of the reactants is doubled, then rate

- a) Remains constant      b) Doubled  
c) Is reduced to half of its value      d) **Is increased by four times of initial rate**

19. Which one of the following is an example of pseudo first order reaction?

- a) **Acid hydrolysis of ester**      b) Decomposition of HI

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c) Synthesis of  $\text{NH}_3$ 

d) All radioactive transformations.

20. When the  $E_a$  of the reaction is zero then the rate constant of the reaction is equal to \_\_\_\_\_

a) 2.303 K

b)  $\frac{k}{2.303}$ c)  $t_{\frac{1}{2}}$ 

d) A

21. Activation energy is equal to \_\_\_\_\_

a) **Threshold energy + energy of colliding molecules**

b) Threshold energy

c) Threshold energy  $\times$  energy of colliding molecules

d) Threshold energy - energy of colliding molecules

22. In a second order reaction, if one of the concentrations is in excess, the order of the reaction is \_\_\_\_\_ order reaction.

a) First

b) **Pseudo first.**

c) Third

d) zero

23. If the activation energy is high, then the rate of reaction is \_\_\_\_\_

a) High

b) **low**

c) cannot be predicted

d) none of these

24. All radioactive transformations follow \_\_\_\_\_

a) zero order kinetics

c) second order kinetics

b) **First order kinetics**

d) third order kinetics

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