(ACTC) ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST. 9940847892.

DON'T STRESS !   **DO YOUR BEST !!**   **FORGET THE REST!!!**

Unit 1 **Basic Concepts of Chemistry and Chemical Calculations**

I. **Choose the best answer.**

1. 40 ml of methane is completely burnt using 80 ml of oxygen at room temperature. The volume of gas left after cooling to room temperature is

(a) 40 ml CO_2 gas   (b) 40 ml CO_2 gas and 80 ml H_2O gas

(c) 60 ml CO_2 gas and 60 ml H_2O gas   (d) 120 ml CO_2 gas

2. An element X has the following isotopic composition $^{200}X = 90$ %, $^{199}X = 8$ % and $^{202}X = 2$ %. The weighted average atomic mass of the element X is closest to

(a) 201 u   (b) 202 u   (c) 199 u   (d) 200 u

3. Assertion : Two mole of glucose contains 12.044×10^{23} molecules of glucose

   Reason : Total number of entities present in one mole of any substance is equal to 6.02×10^{22}

(a) both assertion and reason are true and the reason is the correct explanation of assertion

(b) both assertion and reason are true but reason is not the correct explanation of assertion

(c) assertion is true but reason is false   (d) both assertion and reason are false

4. Carbon forms two oxides, namely carbon monoxide and carbon dioxide. The equivalent mass of which element remains constant?

(a) Carbon   (b) oxygen   (c) both carbon and oxygen   (d) neither carbon nor oxygen

5. The equivalent mass of a trivalent metal element is 9 g eq^{-1} the molar mass of its anhydrous oxide is

(a) 102 g   (b) 27 g   (c) 270 g   (d) 78 g

6. The number of water molecules in a drop of water weighing 0.018 g is

(a) 6.022×10^{26} (b) 6.022×10^{23} (c) 6.022×10^{20} (d) 9.9×10^{22}

7. 1 g of an impure sample of magnesium carbonate (containing no thermally decomposable impurities) on complete thermal decomposition gave 0.44 g of carbon dioxide gas. The percentage of impurity in the sample is

(a) 0 %   (b) 4.4 %   (c) 16 %   (d) 8.4 %

8. When 6.3 g of sodium bicarbonate is added to 30 g of acetic acid solution, the residual solution is found to weigh 33 g.The number of moles of carbon dioxide released in the reaction is

(a) 3   (b) 0.75   (c) 0.075   (d) 0.3

9. When 22.4 litres of H_2 (g) is mixed with 11.2 litres of Cl_2 (g), each at 273 K at 1 atm

the moles of HCl (g), formed is equal to

(a) 2 moles of HCl(g)   (b) 0.5 moles of HCl(g)   (c) 1.5 moles of HCl(g)   (d) 1 moles of HCl(g)

10. How concentrated sulphuric acid is a moderately strong oxidising agent. Which of the following reactions does not show oxidising behaviour?

(a) $Cu + 2H_2SO_4$ $\rightarrow$ $CuSO_4 + SO_2 + 2H_2O$

(b) $C + 2H_2SO_4$ $\rightarrow$ $CO_2 + 2SO_2 + 2H_2O$

(c) $BaCl_2 + H_2SO_4$ $\rightarrow$ $BaSO_4 + 2HCl$ (d) none of the above

11. Choose the disproportionation reaction among the following redox reactions.

(a) $3Mg (s) + N_2 (g)$ $\rightarrow$ $Mg_3N_2 (s)$

(b) $P_4 (s) + 3 NaOH + 3H_2O$ $\rightarrow$ $PH_3(g) + 3NaH_2PO_2 (aq)$

(c) $Cl_2 (g) + 2KI(aq)$ $\rightarrow$ $2KCl(aq) + I_2$

(d) $Cr_2O_3 (s) + 2Al (s)$ $\rightarrow$ $Al_2O_3(s) + 2Cr(s)$

12. The equivalent mass of potassium permanganate in alkaline medium is

E.MUTHUSAMY MSc.,(Che), MSc.,(Psy), MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA

Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

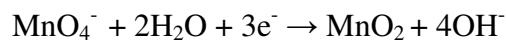$$MnO_4^- + 2H_2O + 3e^- \rightarrow MnO_2 + 4OH^-$$

(a) 31.6   (b) 52.7   (c) 79   (d) None of these

13. Which one of the following represents 180g of water?

(a) 5 Moles of water   (b) 90 moles of water

(c) $\frac{6.022 \times 10^{23}}{180}$ molecules of water   (d) 6.022×10^{24} molecules of water

14. 7.5 g of a gas occupies a volume of 5.6 litres at 0° C and 1 atm pressure. The gas is

(a) NO   (b) N_2O (c) CO   (d) CO_2

15. Total number of electrons present in 1.7 g of ammonia is

(a) 6.022×10^{23} (b) $\frac{6.022 \times 10^{22}}{1.7}$ (c) $\frac{6.022 \times 10^{24}}{1.7}$ (d) $\frac{6.022 \times 10^{23}}{1.7}$

16. The correct increasing order of the oxidation state of sulphur in the anions SO_4^{2-}, SO_3^{2-} , $S_2O_4^{2-}$, $S_2O_6^{2-}$ is

(a) $SO_3^{2-} < SO_4^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$ (b) $SO_4^{2-} < S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$

(c) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-} < SO_4^{2-}$ (d) $S_2O_6^{2-} < S_2O_4^{2-} < SO_4^{2-} < SO_3^{2-}$

17. The equivalent mass of ferrous oxalate is

(a) $\frac{\text{molar mass of ferrous oxalate}}{1}$ (b) $\frac{\text{molar mass of ferrous oxalate}}{2}$

(c) $\frac{\text{molar mass of ferrous oxalate}}{3}$ (d) none of these

18. If Avogadro number were changed from 6.022×10^{23} to 6.022×10^{20}, this would change

(a) the ratio of chemical species to each other in a balanced equation

(b) the ratio of elements to each other in a compound

(c) the definition of mass in units of grams   (d) the mass of one mole of carbon

19. Two 22.4 litre containers A and B contains 8 g of O_2 and 8 g of SO_2 respectively at 273 K and 1 atm pressure, then

(a) Number of molecules in A and B are same

(b) Number of molecules in B is more than that in A.

(c) The ratio between the number of molecules in A to number of molecules in B is 2:1

(d) Number of molecules in B is three times greater than the number of molecules in A.

20. What is the mass of precipitate formed when 50 ml of 8.5 % solution of $AgNO_3$ is mixed with 100 ml of 1.865 % potassium chloride solution?

(a) 3.59 g   (b) 7 g   (c) 14 g   (d) 28 g

21. The mass of a gas that occupies a volume of 612.5 ml at room temperature and pressure (250 c and 1 atm pressure) is 1.1g. The molar mass of the gas is

(a) 66.25 g mol^{-1} (b) 44 g mol^{-1} (c) 24.5 g mol^{-1} d) 662.5 g mol^{-1}

22. Which of the following contain same number of carbon atoms as in 6 g of carbon-12.

(a) 7.5 g ethane   (b) 8 g methane   (c) both (a) and (b)   (d) none of these

23. Which of the following compound(s) has /have percentage of carbon same as that in ethylene (C_2H_4)

(a) propene   (b) ethyne   (c) benzene   (d) ethane

24. Which of the following is/are true with respect to carbon -12.

(a) relative atomic mass is 12 u   (b) oxidation number of carbon is +4 in all its compounds.

(c) 1 mole of carbon-12 contain 6.022×10^{22} carbon atoms.   (d) all of these

E.MUTHUSAMY MSc.$_{(Che)}$, MSc.$_{(Psy)}$, MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA

Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

25. Which one of the following is used as a standard for atomic mass.

(a) $_6C^{12}$ (b) $_7C^{12}$ (c) $_6C^{13}$ (d) $_6C^{14}$

Unit 2 Quantum Mechanical Model of Atom

Choose the best answer

1. Electronic configuration of species M^{2+} is $1s^2 \, 2s^2 \, 2p^6 \, 3s^2 \, 3p^6 \, 3d^6$ and its atomic weight is 56. The number of neutrons in the nucleus of species M is

a) 26   b) 22   c) 30   d) 24

2. The energy of light of wavelength 45 nm is

a) 6.67×10^{15}J   b) 6.67×10^{11}J   c) 4.42×10^{-18}J   d) 4.42×10^{-15}J

3. The energies E_1 and E_2 of two radiations are 25 eV and 50 eV respectively. The relation between their wavelengths ie λ_1 and λ_2 will be

a) $\frac{\lambda_1}{\lambda_2} = 1$ b) $\lambda_1 = 2\lambda_2$ c) $\lambda_1 = \sqrt{25 \times 50} \, \lambda_2$ d) $2\lambda_1 = \lambda_2$

4. Splitting of spectral lines in an electric field is called

a) Zeeman effect   b) Shielding effect   c) Compton effect   d) Stark effect

5. Based on equation $E = -2.178 \times 10^{-18}$ J $\frac{z^2}{n^2}$, certain conclusions are written. Which of them is not correct ? (NEET)

a) Equation can be used to calculate the change in energy when the electron changes orbit

b) For $n = 1$, the electron has a more negative energy than it does for $n = 6$ which means that the electron is more loosely bound in the smallest allowed orbit

c) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus.

d) Larger the value of n, the larger is the orbit radius.

6. According to the Bohr Theory, which of the following transitions in the hydrogen atom will give rise to the least energetic photon ?

a) $n = 6$ to $n = 1$ b) $n = 5$ to $n = 4$ c) $n = 5$ to $n = 3$ d) $n = 6$ to $n = 5$

7. Assertion : The spectrum of He+ is expected to be similar to that of hydrogen

   Reason : He^+ is also one electron system.

(a) If both assertion and reason are true and reason is the correct explanation of assertion.

(b) If both assertion and reason are true but reason is not the correct explanation of assertion.

(c) If assertion is true but reason is false   (d) If both assertion and reason are false

8. Which of the following pairs of d-orbitals will have electron density along the axes ?

a) d_z2, d_{xz} b) d_{xz}, d_{yz} c) $d_z2, d_{x^2-y^2}$ d) $d_{xy}, d_{x^2-y^2}$

9. Two electrons occupying the same orbital are distinguished by

a) azimuthal quantum number   b) spin quantum number

c) magnetic quantum number   d) orbital quantum number

10. The electronic configuration of Eu (Atomic no. 63) Gd (Atomic no. 64) and Tb (Atomic no. 65) are

a) [Xe] $4f^6 \, 5d^1 \, 6s^2$, [Xe] $4f^7 \, 5d^1 \, 6s^2$ and [Xe] $4f^8 \, 5d^1 \, 6s^2$

b) [Xe] $4f^7$, $6s^2$, [Xe] $4f^7 \, 5d^1 \, 6s^2$ and [Xe] $4f^9 \, 6s^2$

c) [Xe] $4f^7$, $6s^2$, [Xe] $4f^8 \, 6s^2$ and [Xe] $4f^8 \, 5d^1 \, 6s^2$

d) [Xe] $4f^6 \, 5d^1 \, 6s^2$, [Xe] $4f^7 \, 5d^1 \, 6s^2$ and [Xe] $4f^9 \, 6s^2$

11. The maximum number of electrons in a sub shell is given by the expression

a) $2n^2$ b) $2l + 1$ c) $4l + 2$ d) none of these

12. For d-electron, the orbital angular momentum is

a) $\frac{\sqrt{2}h}{2\pi}$ b) $\frac{\sqrt{2}h}{2\pi}$ c) $\frac{\sqrt{2}\times 4\,h}{2\pi}$ d) $\frac{\sqrt{6}h}{2\pi}$

13. What is the maximum numbers of electrons that can be associated with the following set of quantum numbers ?
$n = 3, l = 1$ and $m = -1$

a) 4   b) 6   c) 2   d) = 10

14. Assertion : Number of radial and angular nodes for 3p orbital are 1, 1 respectively.

Reason : Number of radial and angular nodes depends only on principal quantum number.

(a) both assertion and reason are true and reason is the correct explanation of assertion.

(b) both assertion and reason are true but reason is not the correct explanation of assertion.

(c) assertion is true but reason is false   (d) both assertion and reason are false

15. The total number of orbitals associated with the principal quantum number $n = 3$ is

a) 9   b) 8   c) 5   d) 7

16. If $n = 6$, the correct sequence for filling of electrons will be,

a) $ns \rightarrow (n-2)\,f \rightarrow (n-1)d \rightarrow np$ b) $ns \rightarrow (n-1)\,d \rightarrow (n-2)\,f \rightarrow np$

c) $ns \rightarrow (n-2)\,f \rightarrow np \rightarrow (n-1)\,d$ d) none of these are correct

17. Consider the following sets of quantum numbers :

	n	l	m	s
(i)	3	0	0	$+\frac{1}{2}$
(ii)	2	2	1	$-\frac{1}{2}$
(iii)	4	3	–2	$+\frac{1}{2}$
(iv)	1	0	–1	$+\frac{1}{2}$
(v)	3	4	3	$-\frac{1}{2}$

Which of the following sets of quantum number is not possible ?

a) (i), (ii), (iii) and (iv)   b) (ii), (iv) and (v)   c) (i) and (iii)   d) (ii), (iii) and (iv)

18. How many electrons in an atom with atomic number 105 can have $(n + l) = 8$?

a) 30   b) 17   c) 15   d) unpredictable

19. Electron density in the yz plane of $3d_{x^2-y^2}$ orbital is

a) zero   b) 0.50   c) 0.75   d) 0.90

20. If uncertainty in position and momentum are equal, then minimum uncertainty in velocity is

a) $\frac{1}{m}\sqrt{\frac{h}{\pi}}$ b) $\sqrt{\frac{h}{\pi}}$ c) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ d) $\frac{h}{4\pi}$

21. A macroscopic particle of mass 100 g and moving at a velocity of 100 cm s^{-1} will have a de Broglie wavelength of

a) 6.6×10^{-29} cm   b) 6.6×10^{-30} cm   c) 6.6×10^{-31} cm   d) 6.6×10^{-32} cm

22. The ratio of de Broglie wavelengths of a deuterium atom to that of an α - particle, when
the velocity of the former is five times greater than that of later, is

a) 4   b) 0.2   c) 2.5   d) 0.4

23. The energy of an electron in the 3rd orbit of hydrogen atom is –E. The energy of an
electron in the first orbit will be

a) –3E   b) –E / 3   c) –E / 9   d) –9E

Subscriber More Materials YouTube / Study Tech Tamil

24. Time independent Schnodinger wave equation is

a) $\hat{H}\psi = E\psi$ b) $\nabla^2\psi + \frac{8\pi^2 m}{h^2}(E + V)\,\psi = 0$

c) $\frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} + \frac{\partial^2\psi}{\partial z^2} + \frac{2m}{h^2}(E - V)\,\psi = 0$ d) all of these

25. Which of the following does not represent the mathematical expression for the Heisenberg uncertainty principle ?

a) $\Delta x \,.\, \Delta p \geq \frac{h}{4\pi}$ b) $\Delta x .\, \Delta v \geq \frac{h}{4\pi m}$ c) $\Delta E \,.\, \Delta t \geq \frac{h}{4\pi}$ d) $\Delta E .\, \Delta x \geq \frac{h}{4\pi}$

Unit 3 PERIODIC CLASSIFICATION OF ELEMENTS

I. Choose the best Answer:

1. What would be the IUPAC name for an element with atomic number 222?

a) bibibiium   b) bididium   c) didibium   d)bibibium

2. The electronic configuration of the elements A and B are $1s^2, 2s^2, 2p^6, 3s^2$ and $1s^2, 2s^2, 2p^5$ respectively. The formula of the ionic compound that can be formed between these elements is

a) AB   b) AB_2 c) A_2B d) none of the above.

3. The group of elements in which the differentiating electron enters the anti penultimate shell of atoms are called

a) p-block elements   b) d-block elements   c) s-block elements   d) f-block elements

4. In which of the following options the order of arrangement does not agree with the variation of property indicated against it? (NEET 2016 Phase 1)

a) I < Br < Cl < F (increasing electron gain enthalpy)

b) Li < Na < K < Rb (increasing metallic radius)

c) $Al^{3+} < Mg^{2+} < Na^+ < F^-$ (increasing ionic size)

d) B < C < O < N (increasing first ionisation enthalpy)

5. Which of the following elements will have the highest electronegativity?

a) Chlorine   b) Nitrogen   c) Cesium   d) Fluorine

6. Various successive ionisation enthalpies (in kJ mol-1) of an element are given below.

IE1	IE2	IE3	IE4	IE5
577.5 1	810 2	750 11	580 14	820

The element is

a) phosphorus   b) Sodium   c) Aluminium   d) Silicon

7. In the third period the first ionization potential is of the order.

a) Na > Al > Mg > Si > P   b) Na < Al < Mg < Si < P

c) Mg > Na > Si > P > Al   d) Na< Al < Mg < Si < P

8. Identify the wrong statement.

a) Amongst the isoelectronic species, smaller the positive charge on cation, smaller is the ionic radius

b) Amongst isoelectric species greater the negative charge on the anion, larger is the ionic radius

c) Atomic radius of the elements increases as one moves down the first group of the periodic table

d) Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table.

9. Which one of the following arrangements represent the correct order of least negative to most negative electron gain enthalpy

a) Al < O < C < Ca < F   b) Al < Ca < O < C < F

 E.MUTHUSAMY MSc.,(Che), MSc.,(Psy), MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA
Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

Subscriber More Materials YouTube / Study Tech Tamil

c) C < F < O < Al < Ca   d) Ca < Al < C < O < F

10. The correct order of electron gain enthalpy with negative sign of F, Cl, Br and I having atomic number 9, 17, 35 and 53 respectively is

a) I > Br > Cl > F   b) F > Cl > Br > I   c) Cl > F > Br > I   d) Br > I > Cl > F

11. Which one of the following is the least electronegative element?

a) Bromine   b) Chlorine   c) Iodine   d) Hydrogen

12. The element with positive electron gain enthalpy is

a) Hydrogen   b) Sodium   c) Argon   d) Fluorine

13. The correct order of decreasing electronegativity values among the elements X, Y, Z and A with atomic numbers 4, 8 , 7 and 12 respectively

a) Y > Z > X > A   b) Z > A > Y > X   c) X > Y > Z > A   d) X > Y > A > Z

14. Assertion: Helium has the highest value of ionisation energy among all the elements known

Reason: Helium has the highest value of electron affinity among all the elements known

a) Both assertion and reason are true and reason is correct explanation for the assertion

b) Both assertion and reason are true but the reason is not the correct explanation for the assertion

c) Assertion is true and the reason is false   d) Both assertion and the reason are false

15. The electronic configuration of the atom having maximum difference in first and second ionization energies is

a) $1s^2, 2s^2, 2p^6, 3s^1$ b) $1s^2, 2s^2, 2p^6, 3s^2$

c) $1s^2, 2s^2, 2p^6, 3s^2, 3s^2, 3p^6, 4s^1$ d) $1s^2, 2s^2, 2p^6, 3s^2, 3p^1$

16. Which of the following is second most electronegative element?

a) Chlorine   b) Fluorine   c) Oxygen   d) Sulphur

17. IE_1 and IE_2 of Mg are 179 and 348 kcal mol^{-1} respectively. The energy required for the reaction $Mg \rightarrow Mg^{2+} + 2 e^-$ is

a) +169 kcal mol^{-1} b) - 169 kcal mol^{-1} c) + 527 kcal mol^{-1} d) - 527 kcal mol^{-1}

18. In a given shell the order of screening effect is

a) s > p > d > f   b) s > p > f > d   c) f > d > p > s   d) f > p > s > d

19. Which of the following orders of ionic radii is correct?

a) H$^-$ > H$^+$ > H   b) Na$^+$ > F$^-$ > O^{2-} c) F$^-$ > O^{2-} > Na$^+$ d) None of these

20. The First ionisation potential of Na, Mg and Si are 496, 737 and 786 kJ mol^{-1} respectively. The ionisation potential of Al will be closer to

a) 760 kJ mol^{-1} b) 575 kJ mol^{-1} c) 801 kJ mol^{-1} d) 419 kJ mol^{-1}

21. Which one of the following is true about metallic character when we move from left to right in a period and top to bottom in a group?

a) Decreases in a period and increases along the group

b) Increases in a period and decreases in a group

c) Increases both in the period and the group   d) Decreases both in the period and in the group

22. How does electron affinity change when we move from left to right in a period in the periodic table?

a) Generally increases   b) Generally decreases

c) Remains unchanged   d) First increases and then decreases

23. Which of the following pairs of elements exhibit diagonal relationship?

a) Be and Mg   b) Li and Mg   c) Be and B   d) Be and Al

Unit 4 Hydrogen

1. Which of the following statements about hydrogen is incorrect ? (NEET - 2016)

a) Hydrogen ion, H_3O^+ exists freely in solution.   b) Dihydrogen acts as a reducing agent.

c) Hydrogen has three isotopes of which tritium is the most common.

d) Hydrogen never acts as cation in ionic salts.

2. Water gas is

a) $H_2O_{(g)}$ b) $CO + H_2O$ c) $CO + H_2$ d) $CO + N_2$

3. Which one of the following statements is incorrect with regard to ortho and para dihydrogen ?

a) They are nuclear spin isomers

b) Ortho isomer has zero nuclear spin whereas the para isomer has one nuclear spin

c) The para isomer is favoured at low temperatures

d) The thermal conductivity of the para isomer is 50% greater than that of the ortho isomer.

4. Ionic hydrides are formed by

a) halogens   b) chalogens   c) inert gases   d) group one elements

5. Tritium nucleus contains

a) $1p + 0 n$ b) $2 p + 1n$ c) $1p + 2n$ d) none of these

6. Non-stoichiometric hydrides are formed by

a) palladium, vanadium   b) carbon, nickel   c) manganese, lithium   d) nitrogen, chlorine

7. Assertion : Permanent hardness of water is removed by treatment with washing soda.

     Reason : Washing soda reacts with soluble calcium and magnesium chlorides and sulphates in   hard water to form insoluble carbonates

a) Both assertion and reason are true and reason is the correct explanation of assertion.

b) Both assertion and reason are true but reason is not the correct explanation of assertion.

c) Assertion is true but reason is false   d) Both assertion and reason are false

8. If a body of a fish contains 1.2 g hydrogen in its total body mass, if all the hydrogen is replaced with deuterium then the increase in body weight of the fish will be

a) 1.2 g   b) 2.4 g   c) 3.6 g   d) $\sqrt{4.8}$ g

9. The hardness of water can be determined by volumetrically using the reagent

a) sodium thio sulphate   b) potassium permanganate   c) hydrogen peroxide   d) EDTA

10. The cause of permanent hardness of water is due to

a) $Ca(HCO_3)_2$ b) $Mg(HCO_3)_2$ c) $CaCl_2$ d) $MgCO_3$

11. Zeolite used to soften hardness of water is, hydrated

a) Sodium aluminium silicate   b) Calcium aluminium silicate

c) Zinc aluminium borate   d) Lithium aluminium hydride

12. A commercial sample of hydrogen peroxide marked as 100 volume H_2O_2, it means that

a) 1 ml of H_2O_2 will give 100 ml O_2 at STP   b) 1 L of H_2O_2 will give 100 ml O_2 at STP

c) 1 L of H_2O_2 will give 22.4 L O_2 d) 1 ml of H_2O_2 will give 1 mole of O_2 at STP

13. When hydrogen peroxide is shaken with an acidified solution of potassium dichromate in presence of ether, the ethereal layer turns blue due to the formation of

a) Cr_2O_3 b) CrO_4^{2-} c) $CrO(O_2)^2$ d) none of these

14. For decolourisation of 1 mole of acidified $KMnO_4$, the moles of H_2O_2 required is

a) 1/2   b) 3/2   c) 5/2   d) 7/2

15. Volume strength of 1.5 N H_2O_2 is

E.MUTHUSAMY MSc.(Che), MSc.(Psy), MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA

Whatsapp: 9940847892   email: **e.muthusamychemistry@gmail.com**   website:www.actcnagercoil.wixsite.com/nagl

a) 1.5   b) 4.5   c) 16.8   d) 8.4

16. The hybridisation of oxygen atom is H_2O and H_2O_2 are, respectively

a) sp and sp^3 b) sp and sp c) sp and sp^2 d) sp^3 and sp^3

17. The reaction $H_3PO^2 + D_2O \rightarrow H_2DPO_2 + HDO$ indicates that hypo-phosphorus acid is

a) tribasic acid   b) dibasic acid   c) mono basic acid   d) none of these

18. In solid ice, oxygen atom is surrounded

a) tetrahedrally by 4 hydrogen atoms   b) octahedrally by 2 oxygen and 4 hydrogen atoms

c) tetrahedrally by 2 hydrogen and 2 oxygen atoms   d) octahedrally by 6 hydrogen atoms

19. The type of H-bonding present in ortho nitro phenol and p-nitro phenol are respectively

a) inter molecular H-bonding and intra molecular H-bonding

b) intra molecular H-bonding and inter molecular H-bonding

c) intra molecular H - bonding and no H - bonding

d) intra molecular H - bonding and intra molecular H - bonding

20. Heavy water is used as

a) modulator in nuclear reactions   b) coolant in nuclear reactions   c) both (a) and (b)   d) none of these

21. Water is a

a) basic oxide   b) acidic oxide   c) amphoteric oxide   d) none of these

Unit 5 Alkali and Alkaline Earth Metals

1. For alkali metals, which one of the following trends is incorrect ?

a) Hydration energy : Li > Na > K > Rb   b) Ionisation energy : Li > Na > K > Rb

c) Density : Li < Na < K < Rb   d) Atomic size : Li < Na < K < Rb

2. Which of the following statements is incorrect ?

a) Li^+ has minimum degree of hydration among alkali metal cations.

b) The oxidation state of K in KO_2 is +1

c) Sodium is used to make Na / Pb alloy   d) $MgSO_4$ is readily soluble in water

3. Which of the following compounds will not evolve H_2 gas on reaction with alkali metals ?

a) ethanoic acid   b) ethanol   c) phenol   d) none of these

4. Which of the following has the highest tendency to give the reaction $M^+_{(g)}$ Aqueous $M^+_{(aq)}$

     Medium

a) Na   b) Li   c) Rb   d) K

5. sodium is stored in

a) alcohol   b) water   c) kerosene   d) none of these

6. RbO_2 is

a) superoxide and paramagnetic   b) peroxide and diamagnetic

c) superoxide and diamagnetic   d) peroxide and paramagnetic

7. Find the wrong statement

a) sodium metal is used in organic qualitative analysis

b) sodium carbonate is soluble in water and it is used in inorganic qualitative analysis

c) potassium carbonate can be prepared by solvay process

d) potassium bicarbonate is acidic salt

8. Lithium shows diagonal relationship with

a) sodium   b) magnesium   c) calcium   d) aluminium

9. Incase of alkali metal halides, the ionic character increases in the order

a) MF < MCl < MBr < MI   b) MI < MBr < MCl < MF

c) MI < MBr < MF < MCl   d) none of these

10. In which process, fused sodium hydroxide is electrolysed for extraction of sodium ?

a) Castner's process   b) Cyanide process   c) Down process   d) All of these

11. The product obtained as a result of a reaction of nitrogen with CaC_2 is (NEET - Phase I)

a) $Ca(CN)_3$ b) CaN_2 c) $Ca(CN)_2$ d) Ca_3N_2

12. Which of the following has highest hydration energy

a) $MgCl_2$ b) $CaCl_2$ c) $BaCl_2$ d) $SrCl_2$

13. Match the flame colours of the alkali and alkaline earth metal salts in the Bunsen burner

(p) Sodium   (1) Brick red

(q) Calcium   (2) Yellow

(r) Barium   (3) Violet

(s) Strontium   (4) Apple green

(t) Cesium   (5) Crimson red

(u) Potassium   (6) Blue

a) p - 2, q - 1, r - 4, s - 5, t - 6, u - 3

b) p - 1, q - 2, r - 4, s - 5, t - 6, u - 3

c) p - 4, q - 1, r - 2, s - 3, t - 5, u - 6

d) p - 6, q - 5, r - 4, s - 3, t - 1, u - 2

14. Assertion : Generally alkali and alkaline earth metals form superoxides

    Reason : There is a single bond between O and O in superoxides.

a) both assertion and reason are true and reason is the correct explanation of assertion

b) both assertion and reason are true but reason is not the correct explanation of assertion

c) assertion is true but reason is false   d) both assertion and reason are false

15. Assertion : $BeSO_4$ is soluble in water while $BaSO_4$ is not

    Reason : Hydration energy decreases down the group from Be to Ba and lattice energy remains almost constant.

a) both assertion and reason are true and reason is the correct explanation of assertion

b) both assertion and reason are true but reason is not the correct explanation of assertion

c) assertion is true but reason is false   d) both assertion and reason are false

16. Which is the correct sequence of solubility of carbonates of alkaline earth metals ?

a) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$ b) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$

c) $CaCO_3 > BaCO_3 > SrCO_3 > MgCO_3$ d) $BaCO_3 > CaCO_3 > SrCO_3 > MgCO_3$

17. In context with beryllium, which one of the following statements is incorrect ?

(NEET Phase - 2)

a) It is rendered passive by nitric acid   b) It forms Be_2C

c) Its salts are rarely hydrolysed   d) Its hydride is electron deficient and polymeric

18. The suspension of slaked lime in water is known as (NEET Phase - II)

a) lime water   b) quick lime   c) milk of lime   d) aqueous solution of slaked lime

19. A colourless solid substance (A) on heating evolved CO_2 and also gave a white residue, soluble in water. Residue also gave CO_2 when treated with dilute HCl.

a) Na_2CO_3 b) $NaHCO_3$ c) $CaCO_3$ d) $Ca(HCO_3)_2$

 E.MUTHUSAMY MSc.(Che), MSc.(Psy), MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA

Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

20. The compound (X) on heating gives a colourless gas and a residue that is dissolved in water to obtain (B). Excess of CO_2 is bubbled through aqueous solution of B, C is formed. Solid (C) on heating gives back X. (B) is

a) $CaCO_3$ b) $Ca(OH)_2$ c) Na_2CO_3 d) $NaHCO_3$

21. Which of the following statement is false ? (NEET - Phase - I)

a) Ca^{2+} ions are not important in maintaining the regular beating of the heart

b) Mg^{2+} ions are important in the green parts of the plants

c) Mg^{2+} ions form a complex with ATP   d) Ca^{2+} ions are important in blood clotting

22. The name 'Blue John' is given to which of the following compounds ?

a) CaH_2 b) CaF_2 c) $Ca_3(PO_4)_2$ d) CaO

23. Formula of Gypsum is

a) $CaSO_4 . 2H_2O$ b) $CaSO_4 . \frac{1}{2} H_2O$ c) $3 CaSO_4 . H_2O$ d) $2CaSO_4 . 2H_2O$

24. When CaC_2 is heated in atmospheric nitrogen in an electric furnace the compound formed is

a) $Ca(CN)_2$ b) $CaNCN$ c) CaC_2N_2 d) $CaNC_2$

25. Among the following the least thermally stable is

(a) K_2CO_3 b) Na_2CO_3 (c) $BaCo_3$ d) Li_2CO_3

Unit 6 GASEOUS STATE

1. Gases deviate from ideal behavior at high pressure. Which of the following statement(s) is correct for non-ideality?

a) at high pressure the collision between the gas molecule become enormous

b) at high pressure the gas molecules move only in one direction

c) at high pressure, the volume of gas become insignificant

d) at high pressure the intermolecular interactions become significant

2. Rate of diffusion of a gas is

a) directly proportional to its density

b) directly proportional to its molecular weight

c) directly proportional to its square root of its molecular weight

d) inversely proportional to the square root of its molecular weight

3. Which of the following is the correct expression for the equation of state of van der Waals gas?

a) $\left[P + \frac{a}{n^2 v^2}\right] (V - nb) = nRT$ b) $\left[P + \frac{na}{n^2 v^2}\right] (V - nb) = nRT$

c) $\left[P + \frac{an^2}{v^2}\right] (V - nb) = nRT$ d) $\left[P + \frac{n^2 a^2}{v^2}\right] (V - nb) = nRT$

4. When an ideal gas undergoes unrestrained expansion, no cooling occurs because the molecules

a) are above inversion temperature   b) exert no attractive forces on each other

c) do work equal to the loss in kinetic energy   d) collide without loss of energy

5. Equal weights of methane and oxygen are mixed in an empty container at 298 K. The fraction of total pressure exerted by oxygen is

(a) 1/3   (b) ½   (c) 2/3   (d) $1/3 \times 273 \times 298$

6. The temperatures at which real gases obey the ideal gas laws over a wide range of pressure is called

a) Critical temperature   b) Boyle temperature

c) Inversion temperature   d) Reduced temperature

7. In a closed room of 1000 m^3 a perfume bottle is opened up. The room develops a smell.

E.MUTHUSAMY MSc.(Che), MSc.(Psy), MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA

Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

Dedication!   Determination!!   Distinction!!!

(ACTC) ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST. 9940847892.
DON'T STRESS !   DO YOUR BEST !!   FORGET THE REST!!!

This is due to which property of gases?

a) Viscosity   b) Density   c) Diffusion   d) None

8. A bottle of ammonia and a bottle of HCl connected through a long tube are opened simultaneously at both ends. The white ammonium chloride ring first formed will be

a) At the center of the tube   b) Near the hydrogen chloride bottle

c) Near the ammonia bottle   d) Throughout the length of the tube

9. The value of universal gas constant depends upon

a) Temperature of the gas   b) Volume of the gas

c) Number of moles of the gas   d) units of Pressure and volume.

10. The value of the gas constant R is

a) 0.082 dm^3 atm.   b) 0.987 cal mol^{-1} K^{-1} c) 8.3 J mol^{-1}K^{-1} d) 8 erg mol^{-1}K^{-1}

11. Use of hot air balloon in sports at meteorological observation is an application of

a) Boyle's law   b) Newton's law   c) Kelvin's law   d) Brown's law

12. The table indicates the value of van der Waals constant 'a' in $(dm^3)^2 atm. mol^{-2}$

Gas	O_2	N_2	NH_3	CH_4
a	1.360	1.390	4.170	2.253

The gas which can be most easily liquefied is

a) O_2 b) N_2 c) NH_3 d) CH_4

13. Consider the following statements

    i) Atmospheric pressure is less at the top of a mountain than at sea level

    ii) Gases are much more compressible than solids or liquids

    iii) When the atmospheric pressure increases the height of the mercury column rises

Select the correct statement

a) I and II   b) II and III   c) I and III   d) I, II and III

14. Compressibility factor for CO_2 at 400 K and 71.0 bar is 0.8697. The molar volume of CO_2 under these conditions is

a) 22.04 dm^3 b) 2.24 dm^3 c) 0.41 dm^3 d) 19.5dm^3

15. If temperature and volume of an ideal gas is increased to twice its values, the initial pressure P becomes

a) 4P   b) 2P   c) P   d) 3P

16. At identical temperature and pressure, the rate of diffusion of hydrogen gas is 3 3 times that of a hydrocarbon having molecular formula C_nH_{2n-2}. What is the value of n ?

a) 8   b) 4   c) 3   d) 1

17. Equal moles of hydrogen and oxygen gases are placed in a container, with a pin-hole through which both can escape what fraction of oxygen escapes in the time required for one-half of the hydrogen to escape. (NEET phase 1)

a) 3/8   b) 1/2   c) 1/8   d) 1/4

18. The variation of volume V, with temperature T, keeping pressure constant is called the coefficient of thermal expansion ie $\alpha = \frac{1}{v}\left(\frac{\partial V}{\partial T}\right)_P$. For an ideal gas α is equal to

a) T   b) 1/T   c) P   d) none of these

19. Four gases P, Q, R and S have almost same values of 'b' but their 'a' values (a, b are Vander Waals Constants) are in the order Q < R < S < P. At a particular temperature, among the four gases the most easily liquefiable one is

a) P   b) Q   c) R   d) S

E.MUTHUSAMY MSc.,(Che), MSc.,(Psy), MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA
Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

20. Maximum deviation from ideal gas is expected from (NEET)

a) $CH_{4(g)}$ b) $NH_{3(g)}$ c) $H_{2(g)}$ d) $N_{2(g)}$

21. The units of Vander Waals constants 'b' and 'a' respectively

a) mol L^{-1} and L atm^2 mol^{-1} b) mol L and L atm mol^2

c) mol^{-1}L and L^2 atm mol^{-2} d) none of these

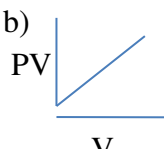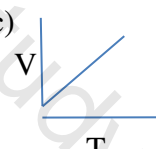22. Assertion : Critical temperature of CO_2 is 304K, it can be liquefied above 304K.

    Reason : For a given mass of gas, volume is to directly proportional to pressure at constant temperature

a) both assertion and reason are true and reason is the correct explanation of assertion

b) both assertion and reason are true but reason is not the correct explanation of assertion

c) assertion is true but reason is false   d) both assertion and reason are false

23. What is the density of N_2 gas at 227°C and 5.00 atm pressure? (R = 0.082 L atm K^{-1} mol^{-1})

a) 1.40 g/L   b) 2.81 g/L   c) 3.41 g/L d) 0.29 g/L

24. Which of the following diagrams correctly describes the behaviour of a fixed mass of an ideal gas ? (T is measured in K)

a)   b)   c)   d) All of these

25. 25g of each of the following gases are taken at 27°C and 600 mm Hg pressure. Which of these will have the least volume ?

a) HBr   b) HCl   c) HF   d) HI

E.MUTHUSAMY MSc.,(Che), MSc.,(Psy), MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA

Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

Unit 7 THERMODYNAMICS

I. Choose the best answer

1. The amount of heat exchanged with the surrounding at constant temperature and pressure is given by the quantity

a) ΔE b) ΔH c) ΔS d) ΔG

2. All the naturally occurring processes proceed spontaneously in a direction which leads to

a) decrease in entropy   b) increase in enthalpy

c) increase in free energy   d) decrease in free energy

3. In an adiabatic process, which of the following is true ?

a) q = w   b) q = 0   c) $\Delta E = q$ d) $P \Delta V = 0$

4. In a reversible process, the change in entropy of the universe is

a) > 0   b) > 0   c) < 0   d) = 0

5. In an adiabatic expansion of an ideal gas

a) $w = -\Delta u$ b) $w = \Delta u + \Delta H$ c) $\Delta u = 0$ d) w = 0

6. The intensive property among the quantities below is

a) mass   b) volume   c) enthalpy   d) $\frac{mass}{volume}$

7. An ideal gas expands from the volume of 1×10^{-3} m^3 to 1×10^{-2} m^3 at 300 K against a constant pressure at 1×10^5 Nm^{-2}. The work done is

a) – 900 J   b) 900 kJ   c) 270 kJ   d) – 900 kJ

8. Heat of combustion is always

a) positive   b) negative   c) zero   d) either positive or negative

9. The heat of formation of CO and CO_2 are – 26.4 kCal and – 94 kCal, respectively. Heat of combustion of carbon monoxide will be

a) + 26.4 kcal   b) – 67.6 kcal   c) – 120.6 kcal   d) + 52.8 kcal

10. C(diamond) $\rightarrow$ C(graphite), ΔH = –ve, this indicates that

a) graphite is more stable than diamond   b) graphite has more energy than diamond

c) both are equally stable   d) stability cannot be predicted

11. The enthalpies of formation of Al_2O_3 and Cr_2O_3 are – 1596 kJ and – 1134 kJ, respectively.

ΔH for the reaction $2Al + Cr_2O_3 \rightarrow 2Cr + Al_2O_3$ is

a) – 1365 kJ   b) 2730 kJ   c) – 2730 kJ   d) – 462 kJ

12. Which of the following is not a thermodynamic function ?

a) internal energy b) enthalpy c) entropy d) frictional energy

13. If one mole of ammonia and one mole of hydrogen chloride are mixed in a closed container to form ammonium chloride gas, then

a) $\Delta H > \Delta U$ b) $\Delta H - \Delta U = 0$ c) $\Delta H + \Delta U = 0$ d) $\Delta H < \Delta U$

14. Change in internal energy, when 4 kJ of work is done on the system and 1 kJ of heat is given out by the system is

a) +1 kJ   b) – 5 kJ   c) +3 kJ   d) – 3 kJ

15. The work done by the liberated gas when 55.85 g of iron (molar mass 55.85 g mol^{-1}) reacts with hydrochloric acid in an open beaker at 250 C

a) – 2.48 kJ   b) – 2.22 kJ   c) + 2.22 kJ   d) + 2.48 kJ

E.MUTHUSAMY MSc.$_{(Che)}$, MSc.$_{(Psy)}$, MEd., MPhil., MA(T),MA(Eng)., MA(Soc).,MA(P.admin).,BLISc.,DMLT, PGDCA

Whatsapp: 9940847892   email: e.muthusamychemistry@gmail.com   website:www.actcnagercoil.wixsite.com/nagl

16. The value of ΔH for cooling 2 moles of an ideal monatomic gas from 125^0 C to 25^0 C at constant pressure will be $\left[given\ Cp = \frac{5}{2} R \right]$

a) – 250 R   b) – 500 R   c) 500 R   d) + 250 R

17. Given that $C(g) + O_2 (g) \rightarrow CO_2 (g)\ \Delta H^0 = -a$ kJ; $2\ CO(g) + O_2(g) \rightarrow 2CO_2(g)\ \Delta H^0 = -b$ kJ; Calculate the ΔH^0 for the reaction $C(g) + \frac{1}{2} O_2(g) \rightarrow CO(g)$

a) $\frac{b+2a}{2}$ b) 2a-b   c) $\frac{2a-b}{2}$ d) $\frac{b-2a}{2}$

18. When 15.68 litres of a gas mixture of methane and propane are fully combusted at 00 C and 1 atmosphere, 32 litres of oxygen at the same temperature and pressure are consumed. The amount of heat of released from this combustion in kJ is (ΔHC (CH_4) $= -890$ kJ mol^{-1} and ΔHC (C_3H_8) $= -2220$ kJ $mol^{-1)}$

a) – 889 kJ   b) – 1390 kJ   c) – 3180 kJ   d) – 653.66 kJ

19. The bond dissociation energy of methane and ethane are 360 kJ mol^{-1} and 620 kJ mol^{-1} respectively. Then, the bond dissociation energy of C-C bond is

a) 170 kJ mol^{-1} b) 50 kJ mol^{-1} c) 80 kJ mol^{-1} d) 220 kJ mol^{-1}

20. The correct thermodynamic conditions for the spontaneous reaction at all temperature is (NEET Phase - I)

a) $\Delta H < 0$ and $\Delta S > 0$ b) $\Delta H < 0$ and $\Delta S < 0$ c) $\Delta H > 0$ and $\Delta S = 0$ d) $\Delta H > 0$ and $\Delta S > 0$

21. The temperature of the system, decreases in an _____

a) Isothermal expansion   b) Isothermal Compression

c) adiabatic expansion   d) adiabatic compression

22. In an isothermal reversible compression of an ideal gas the sign of q, ΔS and w are respectively

a) +, –, –   b) –, +, –   c) +, –, +   d) –, –, +

23. Molar heat of vapourisation of a liquid is 4.8 kJ mol–1. If the entropy change is 16 J mol–1 K–1, the boiling point of the liquid is

a) 323 K   b) 27^0 C   c) 164 K   d) 0.3 K

24. ΔS is expected to be maximum for the reaction

a) $Ca(S) + \frac{1}{2} O_2(g) \rightarrow CaO(S)$ b) $C(S) + O_2(g) \rightarrow CO_2 (g)$

c) $N_2(g) + O_2(g) \rightarrow 2NO(g)$ d) $CaCO_3(S) \rightarrow CaO(S) + CO_2(g)$

25. The values of ΔH and ΔS for a reaction are respectively 30 kJ mol^{-1} and 100 JK^{-1} $mol^{-1.}$ Then the temperature above which the reaction will become spontaneous is

a) 300 K   b) 30 K   c) 100 K   d) 20^0 C

Subscriber More Materials YouTube / Study Tech Tamil