11-12 + JEE/GUJCET

CHEMISTRY

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Sem -1 full course -1 100 marks

2.5 hrs

1. 1 mol of CH_4 contains

(a) 6.02×10^{23} atoms of H

(b) 4 g atom of Hydrogen

(c) 1.81×10^{23} molecules of CH_4

(d) 3.0 g of carbon

2 The mass of a molecule of water is **[Bihar CEE 1995]**

(a) $3\times10^{-26}\ kg$ (b) $3\times10^{-25}\ kg$

(c) $1.5\times10^{-26}\ kg$ (d) $2.5\times10^{-26}\ kg$

3 The number of molecule at NTP in 1 ml of an ideal gas will be

(a) 6×10^{23} (b) 2.69×10^{19}

(c) 2.69×10^{23} (d) None of these

4 Which one of the following pairs of gases contains the same number of molecules

(a) 16 g of O_2 and 14 g of N_2

(b) 8 g of O_2 and 22 g of CO_2

(c) 28 g of N_2 and 22 g of CO_2

(d) 32 g of O_2 and 32 g of N_2

5 How many atoms are contained in one mole of sucrose $(C_{12}H_{22}O_{11})$

(a) $45\times6.02\times10^{23}$ atoms/mole

(b) $5\times6.62\times10^{23}$ atoms/mole

(c) $5\times6.02\times10^{23}$ atoms/mole

(d) None of these

6 Normality of 2M sulphuric acid is

(a) $2N$ (b) $4N$

(c) $\frac{N}{2}$ (d) $\frac{N}{4}$

7 To neutralise 20 ml of $M/10$ sodium hydroxide, the volume of $M/20$ hydrochloric acid required is

(a) 10 ml (b) 15 ml

(c) 20 ml (d) 40 ml

8 $Ca(OH)_2 + H_3PO_4 \rightarrow CaHPO_4 + 2H_2O$ the equivalent weight of H_3PO_4 in the above reaction is

(a) 21 (b) 27

(c) 38 (d) 49

9 Which one of the following is not an element

(a) Diamond (b) Graphite

(c) Silica (d) Ozone

10 The nucleus of helium contains

(a) Four protons

(b) Four neutrons

(c) Two neutrons and two protons

(d) Four protons and two electrons

11 The minimum real charge on any particle which can exist is

(a) $1.6\times10^{-19}\ Coulomb$ (b) $1.6\times10^{-10}\ Coulomb$

(c) $4.8\times10^{-10}\ Coulomb$ (d) Zero

12 The mass of 1 mole of electrons is **[Pb. CET 2004]**

(a) $9.1\times10^{-28}\ g$ (b) $1.008\ mg$

(c) $0.55\ mg$ (d) $9.1\times10^{-27}\ g$

13 The ratio of specific charge of a proton and an α-particle is

(a) 2 : 1 (b) 1 : 2

(c) 1 : 4 (d) 1 : 1

14 The number of unpaired electrons in the Fe^{2+} ion is

(a) 0 (b) 4

(c) 6 (d) 3

15 A sodium cation has different number of electrons from

(a) O^{2-} (b) F^{-}

(c) Li^{+} (d) Al^{+3}

16 An atom which has lost one electron would be

(a) Negatively charged

(b) Positively charged

(c) Electrically neutral

(d) Carry double positive charge

17 The mass number of an anion, X^{3-}, is 14. If there are ten electrons in the anion, the number of neutrons in the nucleus of atom, X_2 of the element will be

(a) 10 (b) 14

(c) 7 (d) 5

18 When α-particles are sent through a thin metal foil, most of them go straight through the foil because (one or more are correct)

(a) Alpha particles are much heavier than electrons

(b) Alpha particles are positively charged

(c) Most part of the atom is empty space

(d) Alpha particles move with high velocity

19 Which one of the following is considered as the main postulate of Bohr's model of atom **[AMU 2000]**

(a) Protons are present in the nucleus

(b) Electrons are revolving around the nucleus

(c) Centrifugal force produced due to the revolving electrons balances the force of attraction between the electron and the protons

(d) Angular momentum of electron is an integral multiple of $\frac{h}{2\pi}$

20 The energy of a radiation of wavelength 8000 Å is E_1 and energy of a radiation of wavelength 16000 Å is E_2. What is the relation between these two

(a) $E_1 = 6E_2$ (b) $E_1 = 2E_2$

(c) $E_1 = 4E_2$ (d) $E_1 = 1/2E_2$

(e) $E_1 = E_2$

21 Which of the following sets of quantum numbers represent an impossible arrangement n l m m_s

(a) 3 2 – 2 (+)$\frac{1}{2}$

(b) 4 0 0 (–)$\frac{1}{2}$

(c) 3 2 –3 (+)$\frac{1}{2}$

(d) 5 3 0 (–) $\frac{1}{2}$

22 If the value of azimuthal quantum number is 3, the possible values of magnetic quantum number would be

(a) 0, 1, 2, 3 (b) 0, – 1, – 2, – 3

(c) 0, ± 1, ± 2, $\pm$ 3 (d) ± 1, ± 2, ± 3

23 The set of quantum numbers not applicable for an electron in an atom is

(a) $n = 1, l = 1, m_l = 1, m_s = +1/2$

(b) $n = 1, l = 0, m_l = 0, m_s = +1/2$

(c) $n = 1, l = 0, m_l = 0, m_s = -1/2$

(d) $n = 2, l = 0, m_l = 0, m_s = +1/2$

24 The energy of an electron in the first Bohr orbit of H atom is $-13.6eV$. The possible energy value(s) of the excited state(s) for electrons in Bohr orbits to hydrogen is(are)

(a) $-3.4eV$ (b) $-4.2eV$

(c) $-6.8eV$ (d) $+6.8eV$

25 Assertion :Thomson's atomic model is known as 'raisin pudding' model.

Reason: The atom is visualized as a pudding of positive charge with electrons (raisins) embedded in it

Read the assertion and reason carefully to mark the correct option out of the options given below :

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

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

(c) If assertion is true but reason is false.

(d) If the assertion and reason both are false.

(e) If assertion is false but reason is true.

26 In acid solution, the reaction $MnO_4^- \rightarrow Mn^{2+}$ involves

(a) Oxidation by 3 electrons

(b) Reduction by 3 electrons

(c) Oxidation by 5 electrons

(d) Reduction by 5 electrons

27 In the reaction, $4Fe + 3O_2 \rightarrow 4Fe^{3+} + 6O^{2-}$ which of the following statement is incorrect

(a) A Redox reaction

(b) Metallic iron is a reducing agent

(c) Fe^{3+} is an oxidising agent

(d) Metallic iron is reduced to Fe^{3+}

28 When iron or zinc is added to $CuSO_4$ solution, copper is precipitated. It is due to

(a) Oxidation of Cu^{+2} (b) Reduction of Cu^{+2}

(c) Hydrolysis of $CuSO_4$ (d) Ionization of $CuSO_4$

29 The compound that can work both as oxidising and reducing agent is

(a) $KMnO_4$ (b) H_2O_2

(c) BaO_2 (d) $K_2Cr_2O_7$

30 The valency of *Cr* in the complex $[Cr(H_2O)_4Cl_2]^+$

(a) 1 (b) 3

(c) 5 (d) 6

31 Which one of the following species possesses maximum size

(a) Na^+ (b) F^-

(c) Ne (d) O^{2-}

32 The ionic radii of N^{3-}, O^{2-}, F^- and Na^+ follow the order

(a) $N^{3-} > O^{2-} > F^- > Na^+$

(b) $N^{3-} > Na^+ > O^{2-} > F^-$

(c) $Na^+ > O^{2-} > N^{3-} > F^-$

(d) $O^{2-} > F^- > Na^+ > N^{3-}$

33 Which has the smallest size

(a) Na^+ (b) Mg^{2+}

(c) Al^{3+} (d) P^{5+}

34A sodium cation has a different number of electrons from

(a) O^{2-} (b) F^-

(c) Li^- (d) Al^{3+}

35 Hydrogen combines with other elements by

(a) Losing an electron

(b) Gaining an electron

(c) Sharing an electron

(d) Losing, gaining or sharing electron

36 In all its properties, hydrogen resembles

(a) Alkali metals only

(b) Halogen only

(c) Both alkali metals and halogens

(d) Neither alkali metals nor halogens

37 Hardness of water is due to presence of salts of

(a) Na^+ and K^+ (b) Ca^{2+} and Mg^{2+}

(c) Ca^{2+} and K^+ (d) Ca^{2+} and Na^+

38 The volume of oxygen liberated from $0.68gm$ of H_2O_2 is

(a) $112\,ml$ (b) $224\,ml$

(c) $56\,ml$ (d) $336\,ml$

39 Chile saltpetre is

[DPMT 1984; CPMT 1986, 89;CET Pune 1998; MP PMT 2003]

(a) $NaNO_3$ (b) Na_2SO_4

(c) KNO_3 (d) Na_2SO_3

40 When sodium bicarbonate is heated the product obtained is

(a) *Na* (b) Na_2CO_3

(c) $NaCO_3$ (d) $Na_2(HCO_3)$

41 Epsom salt is

[EAMCET 1978, 80; BHU 1979; MP PET 1999; CPMT 1988, 89, 90; Bihar MEE 1996]

(a) $CaSO_4.2H_2O$ (b) $BaSO_4.2H_2O$

(c) $MgSO_4.2H_2O$ (d) $MgSO_4.7H_2O$

42 The outer electronic configuration of alkaline earth metal is

(a) ns^2 (b) ns^1

(c) np^6 (d) nd^{10}

43 The IUPAC name of $CH_3CH_2\underset{\displaystyle CH_3}{\underset{|}{CH}}CH_2CH_2CH_3$ is

(a) 4-methylhexane (b) 3-methylhexane

(c) 2-propylbutane (d) 2-ethylpentane

44 What will be the IUPAC name of the given compound

$$CH_3-\underset{\displaystyle CH_2-CH_3}{\underset{|}{CH}}-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-\underset{\displaystyle CH_2-CH_3}{\underset{|}{CH}}-CH_3$$

(a) 2, 5 – diethyl – 4 – methylexane

(b) 3, 4, 6 – trimethyloctane

(c) 2, 5, 6 – trimethyloctane

(d) 3, 5 – dimethyl – 6 – ehtylheptane

45 An organic compound contains 49.3% carbon 6.84% hydrogen and its vapour density is 73. Molecular formula of the compound is (hint Molecular wt = V.D. $\times$ 2)

(a) $C_3H_5O_2$ (b) $C_6H_{10}O_4$

(c) $C_3H_{10}O_2$ (d) $C_4H_{10}O_2$

46 Ethylene possess

(a) Two sigma and two pi bonds

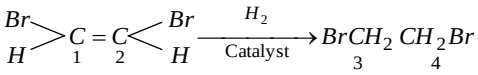
(b) Two pi bonds

(c) Five sigma and one pi bond

(d) Four sigma and one pi bond

47

In the reaction



The hybridisation states of carbon atoms 1, 2, 3, 4 are

(a) 1 and 2 sp^2; 3 and 4 sp^3

(b) 1 and 2 sp^2; 3 and 4 sp

(c) 1, 2, 3 and 4 sp

(d) 1, 2 sp^3; 3, 4 sp^2

48 How many methyl group are present in 2, 5-dimethyl-4-ethylheptane

(a) 2 (b) 3

(c) 4 (d) 5

49 Which of the following carbanion is most stable

(a) Methyl (b) Primary

(c) Secondary (d) Tertiary

50 An alkyl halide may be converted into an alcohol by

(a) Elimination (b) Addition

(c) Substitution(d) Dehydrohalogenation

PART – B 2 MARKER

(1) $K_2Cr_2O_7 + xH_2SO_4 + ySO_2 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + zH_2O$

The values of x, y, z are:

(a) 1, 3, 1 (b) 4, 1, 4 (c) 3, 2, 3 (d) 2, 1, 2

(2) To form 10% w/w solution, 36.5 g HCl must be dissolved in _____ g of water.

(a) 328.5 (b) 365 (c) 401.5 (d) 715.5

(3) If the electronic configuration of nitrogen had $1s^7$, it would have energy lower than that of normal ground state configuration $1s^2 2s^2 2p^3$ because the electrons would be closer to the nucleus. Yet $1s^7$ is not observed because it violates:

(a) Heisenberg uncertainty principle

(b) Hund's rule

(c) Pauli's exclusion principle

(d) Bohr postulates of stationary orbits

(4) The uncertainty in momentum of an electron is $1\times10^{-5}\,kg\,ms^{-1}$. The uncertainty in its position will be:

(a) $1.05\times10^{-28}m$ (b) $5.27\times10^{-26}m$ (c) $1.05\times10^{-30}m$ (d) $5.25\times10^{-28}m$

(5) Which one is descending order of atomic radius of elements of third period.

Na (Z = 11), Mg (Z = 12), Al (Z = 13) and Si (Z= 14)?

(a) Si > Al > Mg > Na (b) Na > Mg > Al > Si

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

(6) Which order is true with reference to size of species?

(a) $Pb < Pb^{2+} < Pb^{4+}$ (b) $Pb^{4+} > Pb^{2+} > Pb$

(c) $Pb > Pb^{2+} > Pb^{4+}$ (d) $Pb^{2+} < Pb < Pb^{4+}$

(7) Which substance is the reducing agent in the reaction?

$CH_3CHO + Ag_2O \rightarrow CH_3COOH + 2Ag$

(a) CH_3CHO (b) Ag_2O (c) CH_3COOH (d) Ag

(8) What is the oxidation number of N in N_3H?

(a) 2 (b) 1 (c) –1/3 (d) 0

(9) What is formed when calcium carbide reacts with heavy water?

(a) CaD_2 and C_2H_2 (b) C_2D_2 and CaH_2

(c) $Ca(OH)_2$ and D_2 (d) C_2D_2 and $Ca(OD)_2$

(10) One mole of calcium phosphide on reaction with excess of water gives:

(a) One mole of phosphine (b) Two mole of phosphoric acid

(c) Two mole of phosphine (d) One mole of phosphorous (V) oxide **Ans:**

(c)

(11) The first ionisation energies of alkaline earth metal are higher than those of the alkali metals. This is because:

(a) there is increase in the nuclear charge of the alkaline earth metal.

(b) there is decrease in the nuclear charge of the alkaline earth metal.

(c) there is change in nuclear charge.

(d) none of the above

(12) What is produced on passing CO_2 gas through an aqueous solution of Na_2CO_3?

(a) NaOH (b) $NaHCO_3$ (c) OH (d) H_2O

PART – C 3 MARKERS

(1) The volume of 32 gram CH_4 gas, 710 gram Cl_2 gas and 64 gram O_2 gas at STP is....., ...and .....litre respectively.

(a) 22.4, 71, 22.4 (b) 44.8, 710, 22.4 (c) 22.4, 710, 44.8 (d) 44.8, 710, 44.8

(2) The angular momentum of an electron of hydrogen atom in L orbit is.....J.S.

(a) 1.1102 (b) 6.626 (c) 2.2086 (d) 2.1102

(3) The correct sequence which shows decreasing order of the ionic radii of the elements is.....

(a) $Na^+ > F^- > Mg^{+2} > O^{-2} > Al^{+3}$ (b) $O^{-2} > F^- > Na^+ > Mg^{+2} > Al^{+3}$

(c) $Al^{+3} > Mg^{+2} > Na^+ > F^- > O^{-2}$ (d) $Na^+ > Mg^{+2} > Al^{+3} > O^{-2} > F^{-1}$

(4) The sum of oxidation number of each H, each peroxide bonded oxygen and each sulphur in H_2SO_5 is.....

(a) + 4 (b) + 6 (c) + 7 (d) + 8

(5) Match list-I with list-II and select the correct answers using the codes given below the list.

	List – I		List – II
1.	Liquid hydrogen	a.	Haber process
2.	Heavy water	b.	Temperature hardness
3.	Hydrogen peroxide	c.	Honey comb
4.	Dihydrogen	d.	Spaceshuttles
5.	Clark's method	e.	Production of fertilizers
6.	$Na_2AlSi_4O_{12}$	f.	Perhydral

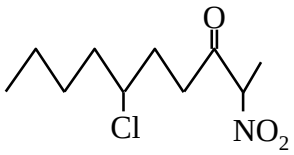
(a) 1 → f, 2 → e, 3 → d, 4 → a, 5 → b, 6 → c

(b) 1 → d, 2 → e, 3 → f, 4 → a, 5 → b, 6 → c

(c) 1 → d, 2 → e, 3 → f, 4 → a, 5 → c, 6 → b

(d) 1 → e, 2 → d, 3 → f, 4 → a, 5 → b, 6 → c

(6) The IUPAC name of the compound



is

(a) 5 – chloro – 1 – nitro nonan – 2 - one (b) 6 – chloro – 2 – nitro decan – 3 – one

(c) 5 – chloro – 9 – nitro decan 3 – one (d) 5 – chloro – 9 – nitro nonan – 3 – one

PART – D 4 MARKERS

(1) Match list-I and list-II and find the correct answer from the code given below.

	List – I Alkyl functional		List – II Name of functional group
1.	$CH_3-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-$	a.	Normal pentyl
2.	$CH_3-(CH_2)_3-CH_2-$	b.	Neopentyl
3.	$C_2H_5-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-$	c.	Isobutyl
4.	$CH_3-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-CH_2-$	d.	Tert. Butyl
5.	$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{\vert}{\underset{\vert}{C}}}}-$	e.	Sec.butyl
6.	$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{\vert}{\underset{\vert}{C}}}}-CH_2-$	f.	Isopropyl

(a) 1 → c, 2 → e, 3 → a, 4 → f, 5 → b, 6 → d

(b) 1 → f, 2 → a, 3 → c, 4 → e, 5 → d, 6 → b

(c) 1 → f, 2 → a, 3 → e, 4 → c, 5 → d, 6 → b

(d) 1 → f, 2 → e, 3 → a, 4 → c, 5 → d, 6 → b

2. The mole fraction of the solute in one molal aqueous solution is (a)0.027 (b) 0.036 (c) 0.018 (d) 0.009

3. The normality of $0.3M$ phosphorus acid (H_3PO_3) is

(a) 0.1 (b) 0.9

(c) 0.3 (d) 0.6