ST. JOSEPH'S COLLEGE, PRAYAGRAJ
HALF-YEARLY EXAMINATION 2025-26
CHEMISTRY
CLASS – IX

TIME: 2 Hours **MM: 80**

Section – A
(Attempt all questions)

Q 1) Choose the correct answer from the options given below. **[15]**

(i) Name a gas which turns Nessler's reagent brown:
(a) ammonia (b) hydrogen sulphide (c) sulphur dioxide (d) Nitrogen dioxide

(ii) The valency of an element is 4. What will be the formula of its oxide?
(a) XO (b) X_2O (c) XO_4 (d) XO_2

(iii) The basic radical in potassium chloride is:
(a) K^+ (b) Cl^- (c) KCl (d) None of these

(iv) The chemical formula of Blue vitriol is:
(a) $Na_2CO_3.10H_2O$ (b) $Na_2SO_4.10H_2O$. (c) $MgSO_4.7H_2O$. (d) $CuSO_4.5H_2O$.

(v) Relation between volume and temperature at constant pressure is given by:
(a) Charles' law (b) Boyle's law (c) Gay Lussac's law (d) Dalton's law

(vi) Which of the following elements has a molecular mass that is two times its atomic mass?
(a) Neon (b) Oxygen (c) Sulphur (d) Phosphorus

(vii) The value of standard temperature in Kelvin is:
(a) 273K (b) -273K (c) 273^0C (d) -273^0C

(viii) The number of valence electron in Na^+ is?
(a) 6 (b) 4 (c) 10 (d) 8

(ix) ~~The basic radical in potassium chloride is:~~ The molecular formula of potassium chloride is:-
(a) K^+ (b) Cl^- (c) KCl (d) None of these

(x) The brown gas evolved on heating of copper nitrate is:
(a) N_2 (b) NO_2 (c) O_2 (d) N_2O_5

(xi) A gas that changes the colour of lime water to milky and also has effect on acidified $K_2Cr_2O_7$ and $KMnO_4$ solution:
(a) SO_2 (b) CO_2 (c) H_2O (d) H_2S

(xii) The action of water on quick lime is an example of which type of reaction:
(a) Combination (b) Displacement (c) Decomposition (d) Redox

(xiii) The formula and valency of aluminate ion is:
(a) AlO_2^{-2} (b) Al_2O^{-1} (c) AlO_2^{-1} (d) AlO^{-2}

(xiv) The formula of a compound represents:
(a) An atom (b) a particle (c) a molecule (d) a combination

(xv) A solution that cannot dissolve anymore of the solute at a given temperature.
(a) Unsaturated solution (b) Supersaturated solution
(c) Crystallisation (d) Saturated solution

Q 2) (i) Fill in the blanks: **[5]**

(a) The valency of copper in Cu_2O is_____. [one/ two]
(b) The photosynthesis reaction is classified as _____ reaction. [endothermic/ decomposition]
(c) The substances which undergo chemical change are called as _____. [reactants/ products]
(d) If an element has two electrons in its outermost shell, then it is likely to be _____. [Metallic / Non-metallic]
(e) A gas that fumes in moist air is _____. [oxygen/ hydrogen chloride]

(ii) Define the following: **[5]**

(a) Unsaturated substance
(b) Absolute zero
(c) Atomic mass unit
(d) Water of crystallisation
(e) Solubility

(iii) Match the following: [5]

(a) Deliquescent substance	1. CaO
(b) Efflorescent substance	2. Conc. H_2SO_4
(c) Solid drying agent	3. NaCl
(d) Dehydrating agent	4. $MgSO_4$
(e) Salt causes permanent hardness	5. $CuSO_4.5H_2O$
	6. $Mg(HCO_3)_2$

(iv) What do you observe when: [5]

(a) When a paper dipped in lead acetate brought near hydrogen sulphide gas.
(b) A rod dipped in concentrated hydrochloric acid is brought near the mouth of a jar filled with ammonia gas.
(c) Carbon dioxide is passed through lime water first in little and then in excess.
(d) Cobalt chloride paper is introduced in water vapour.
(e) HCl gas is passed through silver nitrate solution.

(v) Write the balanced chemical equation for the following. [3]

(a) $NH_3 + O_2 \rightarrow NO + H_2O$
(b) $PbO + NH_3 \rightarrow Pb + H_2O + N_2$
(c) $MnO_2 + HCl \rightarrow MnCl_2 + H_2O + Cl_2$

(vi) Calculate the molecular weight of the following substances: [2]

(a) Aluminium hydroxide
(b) Caustic potash
[atomic mass: Al=27, H=1, O=16, K=39,

Section – B

(Attempt any 4 questions)

Q 3) (i) 2 litres of a gas is enclosed in a vessel at a pressure of 760 mm Hg. If temperature remains constant, calculate the pressure when volume changes to 4 dm^3. [2]

(ii) Compare the effect of temperature on the solubility of a solid and a gas in water. [2]

(iii) State the type of reaction- [3]

(a) $Fe + 3Cl_2 \longrightarrow 2FeCl_3$
(b) $Mg(OH)_2 + H_2SO_4 \longrightarrow MgSO_4 + 2H_2O$
(c) $4HNO_3 \longrightarrow 4NO_2 + 2H_2O + O_2$

(iv) Calculate the percentage of the following: [3]

(a) Oxygen in acetic acid (CH_3COOH)
(b) Carbon in carbonic acid (H_2CO_3)
(c) Nitrogen in ammonia (NH_3)
[Given atomic weight: C=12, H=1, O=16, N=14]

Q 4) (i) Give reason for the following: [2]

(a) Certain elements exhibit more than one valency.
(b) The chemical equations need to be balanced.

(ii) Write the chemical name of the following compounds [2]

(a) $NaHSO_3$ (b) $NaAlO_2$

(iii) Differentiate between the following- [3]

(a) Deliquescent and hygroscopic substance.
(b) soft water and hard water.
(c) Na and Na^+

(iv) Answer the following: [3]

(a) State Boyle's law.
(b) Write the mathematical expression of Boyle's law.
(c) Give reason why inflating a balloon seems to violate Boyle's law.

Q 5) (i) Give reason: [2]

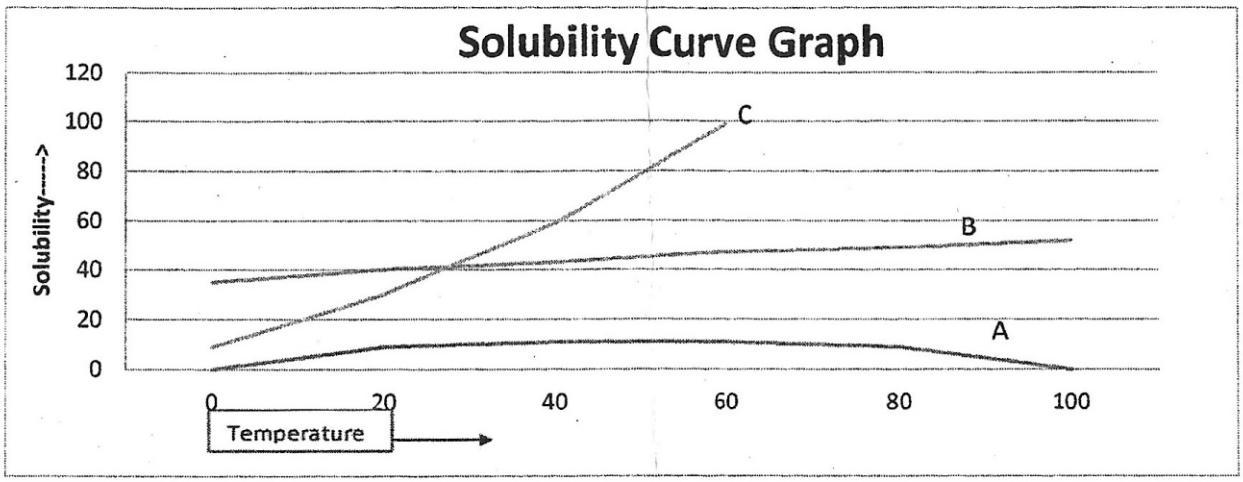
(a) Hot air balloons are used for meteorological purposes.

(b) Use of rubbing the area affected with sting of bee with baking soda.

(ii) State two disadvantages of hard water. [2]

(iii) A cylinder of 20 litres capacity contains a gas at 100 atmospheric pressure. How many flasks of 200cm^3 capacity can be filled from it at 1 atmosphere pressure, temperature remaining constant? [3]

(iv) Predict the name of solids given as **A, B** and **C** showing the variation in solubility with changing temperature in the following solubility curve graph. [3]



Q 6) (i) Convert [2]

(a) -283^{0}C to K (b) 546K to ^{0}C

(ii) 2500cm^3 of hydrogen is taken at STP. The pressure of this gas is further increased by two and a half times (temperature remaining constant). What volume will hydrogen occupy now? [2]

(iii) Calculate the percentage composition of oxygen and potassium in $KClO_3$ [3]

(atomic mass of K=39, Cl=35.5 and O=16)

(iv) Give reason for the following: [3]

(a) Water is called as universal solvent.

(b) It is necessary to specify the temperature and pressure of a gas while stating its volume.

(c) Table salt is deliquescent in nature.

Q 7) (i) State the valency of the element having: [2]

(a) seven valence electrons

(b) electronic configuration 2,8,8

(ii) Differentiate between the following: [2]

(a) An exothermic and an endothermic reaction.

(b) Drying and dehydrating agent.

(iii) (a) Write one importance of dissolved salts in water. [3]

(b) Write equations for the removal of temporary hardness by boiling and by adding washing soda.

(iv) At 0^{0}C and 760mm Hg pressure, a gas occupies a volume of 100cm^3.The Kelvin temperature of the gas is increased by one -fifth and the pressure is increased one and a half times. Calculate the final volume of the gas. [3]

Q 8) (i) Give a chemical test to distinguish between the following gases: [2]

(a) Hydrogen and Oxygen

(b) Sulphur dioxide and hydrogen sulphide.

(ii) Differentiate between the temporary and permanent hardness of water. [2]

(iii) The formula of the chloride of a metal 'M' is MX_2. State the formula of its: [3]

(a) Carbonate (b) Hydroxide (c) Nitrate

(iv) (a) Write mathematical expression of the gas equation. [3]

(b) One litre of a gas at 10°C is heated till both volume and pressure are tripled. Find the new temperature.