

**CBSE Board
Class XI
Chemistry
Sample Paper 9**

Q1. How many atoms are present in 49 g of H_2SO_4 ?

- (a) $3 \times 6.02 \times 10^{23}$
- (b) $7 \times 3.011 \times 10^{23}$
- (c) $2 \times 6.022 \times 10^{23}$
- (d) $49 \times 6.022 \times 10^{23}$

Sol. (b)

In 1 mole, (98 g) 6.022×10^{23} molecules are present.

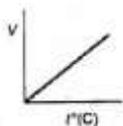
49 g of it contains $6.022 \times \frac{10^{23}}{2} = 3.011 \times 10^{23}$ molecules.

In one molecule of H_2SO_4 , 7 atoms are present.

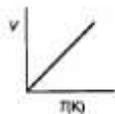
Hence total number of atoms = $3.011 \times 10^{23} \times 7$

Q2. Which does not represent isobar given by Charles' law?

(a)



(b)



- (c) Both (a) and (b)
- (d) None of these

Sol. (a)

Q3. 0.24 g of a volatile gas upon vaporization gives 45 mL vapour at NTP. What will be the vapour density of the substance? (density of $H_2 = 1$)

- (a) 95.39
- (b) 5.973
- (c) 95.93
- (d) 59.73

Sol. (d)

Q4. A large cylinder of helium filled at 1000 pascal had a small thin orifice through which helium escaped into an evacuated space at the rate of 6.4 mmol/h. How long will it take for 10 mmol SO_2 to leak through a similar orifice if the SO_2 were confined at the same pressure?

- (a) 6.25h
- (b) 0.39h
- (c) 4.42 h
- (d) 1.00h

Sol. (a)

$$\frac{r_{SO_2}}{r_{He}} = \sqrt{\frac{4}{64}} = \frac{1}{4}$$

$$\therefore r_{SO_2} = \frac{1}{4} (r_{He}) = 1.6 \text{ mmol /h}$$

$$\therefore \text{Time taken by 10 mmol } SO_2 = \frac{10}{1.6} = 6.25 \text{ h}$$

Q5. The triple point of CO_2 occurs at 5.1 atm and $-56^\circ C$. Its critical temperature is $31^\circ C$ and solid CO_2 is more dense than liquid CO_2 . Under which suitable condition is liquid CO_2 stable at equilibrium?

- (a) 10 atm, $-25^\circ C$
- (b) 5.1 atm, $-25^\circ C$
- (c) 10 atm, $33^\circ C$
- (d) 5.1 atm, $-100^\circ C$

Sol. (a)

Q6. The temperature at which a real gas obeys the ideal gas laws over fairly wide range of pressure is

- (a) critical temperature
- (b) inversion temperature
- (c) Boyle's temperature
- (d) reduced temperature

Sol. (c)

- Q7. Which of the following is a correct statement?
- (a) Surface tension of a liquid decreases with increase in temperature.
 - (b) Vapour pressure of a liquid decreases with increase in temperature.
 - (c) Viscosity, ρ of a liquid decreases with decrease in temperature.
 - (d) In gravity free environments, droplets of a liquid on flat surface are slightly flattened.

Sol. (a)
Surface tension of a liquid decreases with increase in temperature.
As the temperature increases, the kinetic energy of the molecules increases and hence, intermolecular attraction decreases which in turn decreases the surface tension.

- Q8. For the energy levels in an atom, which one of the following statement is correct?
- (a) there are only seven principal electron energy levels
 - (b) The second principal energy level has four orbitals and can accommodate a maximum of eight electrons
 - (c) The M energy level can have a maximum of 32 electrons
 - (d) The 4s sub-energy level has higher energy than 3d sub-energy level

Sol. (b)
There are more than 7 principal energy levels.
M energy level has a value of 3 for n.
That is, it can accommodate a maximum of $2n^2 = 2 \times 3^2 = 18$ electrons.
Energy level 3d is of higher energy than 4s.
Hence option 2 alone is correct.

- Q9. Which of the following is not paramagnetic?
- (a) N_2^+
 - (b) CO
 - (c) O_2^-
 - (d) NO

Sol. (b)

- Q10. In which of the following pairs the two species have identical bond order?

- (a) N_2^-, O_2^{2-}
- (b) N_2^+, O_2^-
- (c) N_2^-, O_2^+
- (d) O_2^+, N_2^{-2}

Sol. (c)
The bond orders in the case of N_2^- and O_2^+ are 2.5 each

Q11. Amount of the heat liberated when 0.49 g of sulphuric acid is neutralized by NaOH is

- (a) -57.3 kJ
- (b) -5.73 kJ
- (c) -0.573 kJ
- (d) -0.573 kJ

Sol. (c)

	Amount	Heat liberated
Eq. mass of $H_2SO_4 = 49$	49 g	57.3 kJ
Amount of heat liberated = 0.573 kJ	0.49 g	?

Q12. The formation of toluene from benzene and methyl chloride in presence of anhydrous aluminium chloride is an example for

- (a) acid base catalysis
- (b) homogeneous catalysis
- (c) enzyme catalysis
- (d) heterogeneous catalysis

Sol. (d)
Reactants and catalysts are in different phases

Q13. Amount of heat liberated when one mole of a strong dibasic acid is completely neutralized by a strong base is

- (a) 57.3 kJ
- (b) - 57.3 kJ
- (c) 114.6 kJ
- (d) - 114.6 kJ

Sol. (c)
One mole of a dibasic acid contains 2 g equivalent weights. Hence heat liberated is $57.3 \times 2 = 114.6 \text{ kJ}$

Q14. Assertion (A) On addition of NH_2Cl to NH_4OH solution, pH decreases but remains greater than 7.

Reason (R) Addition of NH_4^+ ion decreases ionization of NH_4OH thus, $[OH^-]$ is decreased, pH decreases.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (c) (A) is true but (R) is false.
- (d) (A) is false but (R) is true.

Sol. (a)

Q15. Which of the following does not represent redox reaction?

- (a) $2Ca(OH)_2 + Cl_2 \rightarrow Ca(ClO)_2 + CaCl_2 + 2H_2O$
- (b) $Cr_2O_7^{2-} + 2OH^- \rightarrow 2CrO_4^{2-} + H_2O$
- (c) $NaIO_3 + NaHSO_3 \rightarrow NaHSO_4 + Na_2SO_4 + I_2 + H_2O$
- (d) $2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$

Sol. (b)
No element in this reaction has undergone a change in oxidation state

Q16. In the sixth period, the orbitals being filled are

- (a) 5s, 5p, 5d
- (b) 6s, 6p, 6d, 6f
- (c) 6s, 5f, 6d, 6p
- (d) 6s, 4f, 5d, 6p

Sol. (d)
The increasing order of energy of orbitals is
1s 2s, 2p 3s, 3p 4s, 3d, 4p 5s, 4d, 5p 6s, 4f, 5d, 6p 7s, 5f, 6d, 7p
2 10 18 36 54 86 118
Hence in 6th period 32 elements ($Z = 54$ to 86) are present and the orbitals being filled are 6s, 4f, 5d, 6p

Q17. For pure covalent bond formation, the combining atoms should have

- (a) equal electronegativity
- (b) different electronegativity
- (c) one should be electropositive and other should be electronegative
- (d) none of these

Sol. (a)

Q18. Assertion (A) On passing H_2 gas into aqueous Fe^{3+} solution, resulting solution gives test of Fe^{3+} .

Reason (R) $H_2(g)$ reduces Fe^{3+} to Fe^{2+} but Fe^{2+} is oxidized to Fe^{3+} by atmospheric oxygen.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (c) (A) is true but (R) is false.
- (d) (A) is false but (R) is true.

Sol. (c)

Q19. The decomposition of H_2O_2 is accelerated by-

- (a) Glycerine
- (b) Alcohol
- (c) Phosphoric acid
- (d) Pt powder

Sol. (d)
Decomposition of H_2O_2 can be accelerated by finely divided metals such as Ag, Au, Pt, Co, Fe etc

- Q20. Metallic luster exhibited by metallic sodium is explained by
(a) diffusion of sodium ions
(b) oscillation of bonding electrons
(c) excitation of protons
(d) existence of body centred cubic lattice

Sol. (b)

- Q21. **Assertion (A)** NaOH cannot be stored in a vessel made of Al or Zn.
Reason (R) A protective layer of oxide is formed on the surface of the metal.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

Sol. (c)

- Q22. Ozone is formed in the upper atmosphere from oxygen by the action of
(a) Ultraviolet rays
(b) Thermal radiation from sunlight
(c) Free radicals
(d) Nitrogen oxides

Sol. (a)
$$\text{O}_2 \xrightarrow{\text{UV, } h\nu} \text{O} + \text{O}$$
$$\text{O} + \text{O}_2 \xrightarrow{\text{UV, } h\nu} \text{O}_3$$

- Q23. Atmosphere of big/metropolitan cities is polluted most by
(a) Automobile exhausts
(b) Pesticide residue
(c) Household waste
(d) Radioactive fall out.

Sol. (a)
Atmosphere of big cities is polluted most by automobile exhaust which is a symbol of urbanisation.

- Q24. **Assertion (A)** In fusion test, (if N and S both are present) there is formation of blood-red colour on addition of FeCl_3 to sodium-extract.
Reason (R) On fusion with Na, NaCNS is formed which forms a blood-red coloured complex $[\text{Fe}(\text{CNS})]^{2+}$ with FeCl_3 solution.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

Sol. (a)

- Q25. A compound (60 g) on analysis gives $C = 24\text{ g}$, $H = 4\text{ g}$ and $O = 32\text{ g}$. Its empirical formula is
 (a) $C_2H_4O_2$
 (b) C_2H_2O
 (c) CH_2O_2
 (d) CH_2O

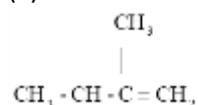
Sol. (d)

Element	C	H	O
Percentage	$\frac{24}{60} \times 100 = 40$	$\frac{4}{60} \times 100 = 6.66$	$\frac{32}{60} \times 100 = 53.3$
Atomic ratio	$\frac{40}{12}$	$\frac{6.66}{1}$	$\frac{53.3}{16}$
Simple whole no. ratio	1	2	1

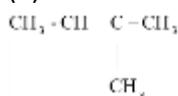
Hence empirical formula is CH_2O .

- Q26. The structural formula of 3 - methyl -1 - butene is

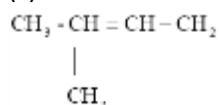
(a)



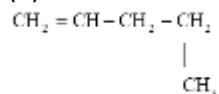
(b)



(c)



(d)

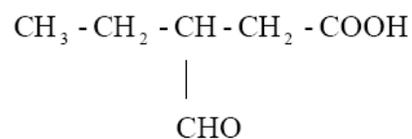


Sol.

(c)

In 3 - methyl - 1 butene, there should be 4 carbon atoms in the straight chain with a double bond at one end. The carbon atoms are numbered from that end which contains the double bond

- Q27. IUPAC name of the compound



- (a) 3-ethyl-4-oxo-butanoic acid
 (b) 3-formylbutanoic acid

- (c) 3-pentane-3-al-1-oic acid
 (d) 3-formylpentanoic acid

Sol. (d)
 When -COOH and -CHO groups are present -COOH group is a principal functional group and CHO becomes substituent group.
 Hence it is named as formyl. (Note Here carbon atom of CHO is not a part of parent chain)

- Q28. -M effect is shown by
 (a) -OCH₃
 (b) -Cl
 (c) -OH
 (d) -NO₂

Sol. (d)
 If the key atom (atom connected to benzene ring) is connected to more electronegative atom by a multiple bond show -M effect

- Q29. In the sequence of the following reaction,

$$C_2H_2 + H_2O \xrightarrow[60^\circ C, Hg_2SO_4]{dil. H_2SO_4} A \xrightarrow{(O)} B$$
 the compounds

The compounds

A and B are

- (a) acetone and acetic acid
 (b) acetaldehyde and ethyl alcohol
 (c) ethyl alcohol and acetaldehyde
 (d) acetaldehyde and acetic acid

Sol. (d)

30. A salt producing hydrocarbon among these compounds is
 (a) methane
 (b) ethane
 (c) ethyne
 (d) ethane

Sol. (c)
 Ethyne contains acidic hydrogens. Hence they can be replaced by metal atoms.
 The products formed are called acetylides and can be considered as salts.
 Eg : On passing ethyne through ammoniacal silver nitrate a white precipitate of silver acetylide is obtained.

