St. Mary's School, Dwarka
Holiday Homework
Class XI
Subject: Chemistry (043)

General Instructions :

(i) Question numbers 1 to 4 are objective type question and carry 1 mark each.
(ii) Question numbers 5 case study.
(iii) Question numbers 6 to 10 are short answer questions and carry 2 marks each(word limit : 50 – 60 words)
(iv) Question numbers 11 to 15 are short answer questions and carry 3 marks each(word limit : 80 – 100 words)

Q.1 The reaction of calcium with water is represented by the equation

$Ca + 2H_2O \text{ ------} \rightarrow Ca(OH)_2 + H_2$

What volume of H2 at STP would be liberated when 8 gm of calcium completely reacts with water?

(a) 0.2 cm^3 (b) 0.4 cm^3 (c) 2240 cm^3 (d) 4480 cm^3 1

Q.2 Among the following groupings which represents the collection of isoelectronic species?

(a) NO^+ , C_2^{2-} ,O_2^- ,CO (b) N_2, C_2^{2-}, CO, NO

(c) CO, NO^+, CN-, C_2^{2-} (d) NO, CN^-, N_2, O_2^- 1

Q.3 How many number of σ- and π-bonds present in pent-4-en-1-yne ?

(a) 10, 3 (b) 4, 9 (c) 3, 10 (d) 9, 4 1

Q.4 The molar heat capacity of water at constant pressure is 75 JK^{-1} mol^{-1}. When 1kJ of heat is supplied to 100 g of water, which is free to expand. What is the increase in temperature of water ?

(a) 6.6 K (b) 1.2 K (c) 2.4 K (d) 4.8 K 1

Q.5 Observe the table of the ionisation constants of some common polyprotic acid at 298 K. Answer the questions based on this table and related studied concepts.

The Ionisation Constants of Some Common Polyprotic Acids (298K)

Acid	K*a*1	K*a*2	K*a*3
Oxalic acid	$\mathbf{5.9 \times 10^{-2}}$	$\mathbf{6.4 \times 10^{-5}}$	
Ascorbic acid	$\mathbf{7.4 \times 10^{-4}}$	$\mathbf{1.6 \times 10^{-12}}$	
Sulphurous acid	$\mathbf{1.7 \times 10^{-2}}$	$\mathbf{6.4 \times 10^{-8}}$	
Sulphuric acid	Very large	$\mathbf{1.2 \times 10^{-2}}$	
Carbonic acid	$\mathbf{4.3 \times 10^{-7}}$	$\mathbf{5.6 \times 10^{-11}}$	
Citric acid	$\mathbf{7.4 \times 10^{-4}}$	$\mathbf{1.7 \times 10^{-5}}$	$\mathbf{4.0 \times 10^{-7}}$
Phosphoric acid	$\mathbf{7.5 \times 10^{-3}}$	$\mathbf{6.2 \times 10^{-8}}$	$\mathbf{4.2 \times 10^{-13}}$

(*a*) Why is Ka_1 greater than Ka_2?

(b) Arrange Ka_1, Ka_2 and Ka_3 in phosphoric acid.

(c) Why is $Ka_1 >>> Ka_2$ in sulphuric acid ?

(d) Write expression for Ka_1 and Ka_2 and Ka of H_2CO_3.

(e) Out of oxalic acid and citric acid, which is stronger? 5

Q.6 What is tautomerism? Give an example of tautomerism. 2

Q.7 Write structural formulae for compounds named as-
(a) 1-Bromoheptane (b) 5-Bromoheptanoic acid 2

Q.8 Why does SO_3 act as an electrophile ? 2

Q.9 pH of a solution of a strong acid is 5.0. What will be the pH of the solutionobtained after diluting the given solution a 100 times? 2

Q.10 Which transition in the hydrogen atomic spectrum will have the same wavelength as the transition, n = 4 to n = 2 of He^+ spectrum? 2

Q.11 How can you predict the following stages of a reaction by comparing the value of Kc and Qc?
(i) Net reaction proceeds in the forward direction.
(ii) Net reaction proceeds in the backward direction.
(iii) No net reaction occurs. 3

Q.12 Balance the following ionic equations by ion-electron method
(i) $MnO_4^- + SO_3^{2-} + H^+ \longrightarrow Mn^{2+} + SO_4^{2-} + H_2O$ (acidic medium)
(ii) $MnO_4^- + I^- \longrightarrow MnO_2 + IO_3^-$ (basic medium) 3

Q.13 What is the molarity of H_2SO_4 solution, which has a density 1.84 g/cc. at 35° C and contains 98% by weight ? 3

Q.14 Define enthalpy of formation. Write the chemical equation of the formation of methanol. 3

Q.15 Write the IUPAC name of the following compounds:
(i) o-xylene (ii) Lactic acid (iii) Acetophenone
(iv) Acetonitrile (v) Methyl acetate (vi) Acetamide 3