PHYSICAL / INORGANIC CHEMISTRY

DPP
DAILY PRACTICE PROBLEMS

DPP No. 37

Total Marks : 39

Max. Time : 42 min.

Topic : p-block elements (Nitrogen and Oxygen family)

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.6	(3 marks, 3 min.)	[18, 18]
Multiple choice objective ('–1' negative marking) Q.7	(4 marks, 4 min.)	[4, 4]
True or False (no negative marking) Q.8	(2 marks, 2 min.)	[2, 2]
Assertion and Reason (no negative marking) Q.9	(3 marks, 3 min.)	[3, 3]
Subjective Questions ('–1' negative marking) Q.10	(4 marks, 5 min.)	[4, 5]
Match the Following (no negative marking) Q. 11	(8 marks, 10 min.)	[8, 10]

1. **(a)** Which one of the following reactions will give oxygen gas ?

(A) A reaction of PbO_2 with concentrated HNO_3. (B) A reaction of MnO_2 with concentrated H_2SO_4.

(C) A reaction of $KMnO_4$ with concentrated HCl. (D) (A) and (B) both

(b) Which of the following statement is correct ?

(A) Al_2O_3, ZnO, TeO_2 and Sb_2O_3 are amphoteric oxides.

(B) Super oxides dissolve in water forming hydrogen peroxide and liberating oxygen gas.

(C) CrO_3, Mn_2O_7 , P_4O_{10} and Cl_2O_7 are acidic oxides.

(D) All of these.

2. Which of the following is used as a bleaching agent ?

(A) Hydrogen peroxide (B) Ozone (C) calgon (D) (A) and (B) both

3. **(a)** The oxidation number of sulphur in S_2Cl_2, SF_4 and S_8 respectively are :

(A) +1, + 4 and 0 (B) + 2, + 4 and – 2 (C) 0, + 4 and – 1 (D) 0, + 4 and 0

(b) H_2S cannot be dried by :

(A) anhydrous $CaCl_2$ (B) P_2O_5 (C) Conc. H_2SO_4 (D) All of these

4. **(a)** Hot concentrated sulphuric acid dissolves sulphur forming

(A) SO_3 (B) SO_2 (C) H_2SO_3 (D) $H_2S_2O_3$

(b) $KClO_3 + H_2SO_4 \xrightarrow{\Delta} KHSO_4 + HClO_4 + (X) + H_2O$.

The product [X] is :

(A) O_2 (B) Cl_2 (C) ClO_2 (D) Cl_2O_3

5. Which of the following statement is false for sulphurdioxide ?

(A) It reacts with dry chlorine in presence of charcoal to form sulphuryl chloride.

(B) It reduces KIO_3 to iodine in acidic medium.

(C) It when passed through a solution of sodium sulphide, produces Na_2SO_3.

(D) It oxidises $SnCl_2$ to $SnCl_4$ in presence of HCl.

6. **(a)** Consider the following statements

(i) Sulphur dioxide exists as discrete SO_2 molecules in gaseous as well as solid state.

(ii) Sulphur trioxide exists in several modifications in solid state ; cyclic trimer, and polymeric chain.

(iii) Bleaching by sulphur dioxide is through reduction process and is temporary.

Select the correct one from the codes given.

(A) (i) and (ii) only (B) (i), and (iii) only (C) (i), (ii) and (iii) (D) (ii) and (iii) only.

(b) Which of the following is correct ?

(A) S_3O_9 – contains no S–S linkage. (B) $S_2O_6^{2-}$ – contains –O–O– linkage.

(C) $(HPO_3)_3$ – contains P – P linkage (D) $S_2O_8^{2-}$ contains S–S linkage

7. **(a)** Aqueous solution of hydrogen peroxide :
(A) turns blue litmus pink
(B) gives bright blue colour in ether with acidified $K_2Cr_2O_7$ solution.
(C) gives yellow or orange coloured solution with an acidified solution of titanium salt.
(D) bleaches blue litmus.

(b) Which of the following statement(s) is / are true for the hydrides of the elements of 16^{th} group?
(A) Their acidic character increases from H_2O to H_2Te
(B) Their thermal stability increases from H_2O to H_2Te
(C) Their reducing character increases from H_2S to H_2Te
(D) The order of their boiling points is $H_2S < H_2Se < H_2Te < H_2O$

8. **(a)** Consider the following statements
S_1 : $(HPO_3)_n$ can be prepared by heating phosphorus acid and bromine in a sealed tube.
S_2 : Dry iodine reacts with ozone and forms a yellow solid, I_4O_9.
S_3 : β-Sulphur is stable below 369 K.
and arrange in the order of true/false.
(A) F T F (B) T T F (C) T T T (D) T F F

(b) True / false.
S_1 : Sodium thiosulphate with $FeCl_3$ solution develops a pink or violet colour which soon vanishes.
S_2 : White precipitate of PbS_2O_3 gets soluble when boiled with water.

9. **Statement-1:** Aqueous solution of hydrogen peroxide is kept in glass or metal container containing some urea or phosphoric acid beacuse
Statement-2 : Urea or phosphoric acid acts as a negative catalyst for the decomposition of hydrogen peroxide.
(A) Statement 1 and statement 2 are correct and statement 2 is the correct explanation of statement 1.
(B) Statement 1 and statement 2 are correct but statement 2 is not correct explanation of statement 1.
(C) Statement 1 is correct but statement 2 is false.
(D) Statement 1 is false but statement 2 is correct.

10. **(a)** There is large difference in the melting and boiling points of oxygen and sulphur. Explain.
(b) Why solution of sodium thiosulphate turns milky on acidification ?
(c) Out of following forms of sulphur which one is paramagnetic and why ? S_8, S_6 and S_2.

11. Match the following (one or more then one)

Column - I	**Column - II**
(A) $H_2Te < H_2O$	(p) Boiling point
(B) $SO_2 < SO_3$	(q) Thermal stability
(C) $H_2O_2 < H_2SO_4$	(r) Acidic character
(D) $PH_3 < NH_3$	(s) Reducing character

Answer Key

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1. **(a)** (D) **(b)** (D) **2.** (D) **3.** **(a)** (A) **(b)** (C) **4.** **(a)** (B) **(b)** (C) **5.** (C)
6. **(a)** (C) **(b)** (A) **7.** **(a)** (B,C,D) **(b)** (A,C,D)
8. **(a)** (B) **(b)** **S_1 : (True) ; S_2 : (false)** **9.** (D)
10. **(a)** On the basis of atomicity, oxygen diatomic where as sulphur is polyatomic.
(b) $Na_2S_2O_3 + 2H^+ \longrightarrow 2Na^+ + H_2SO_3 + S\downarrow$ (colloidal sulphur)
(c) S_2 (in vapour state) has two unpaired electrons, like O_2
11. (A - p, q); (B - p, q, r) (C - p, q, r); (D - p, q)

Hints & Solutions

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1. **(a)** $PbO_2 + 2HNO_3 \longrightarrow Pb(NO_3)_2 + 1/2\ O_2 + H_2O$

$2MnO_2 + 2H_2SO_4 \longrightarrow 2MnSO_4 + H_2O + O_2$

$2\ KMNO_4 + 16HCl \longrightarrow 2KCl + 2MnCl_2 + 8H_2O + 5Cl_2$

2. (A) and (B). Source NCERT

3. **(b)** $H_2S + H_2SO_4 \longrightarrow 2H_2O + SO_2 + S$

4. **(a)** $3S + H_2SO_4 \longrightarrow 3SO_2 + 2H_2O$

5. $2Na_2S(aq) + 3SO_2(g) \longrightarrow S\downarrow + Na_2S_2O_3\ (aq)$

7. **(b)** (A), (B) (C) can be explained on the basis of decrease in bond (H-E) dissociation enthalpy (D) Hydrogen bonding, and van der Waal's force of attraction.

8. **(a)** S_1 (NCERT), S_3 β-Sulphur is stable above 369K.

(b) (D) $PbS_2O_3 + H_2O \xrightarrow{\Delta} PbS\downarrow$ (black) $+ H_2SO_4$

9. Kept in plastic or wax-lined glass containers containing urea or phosphoric acid.

10. **(a)** on the basis of atomicity, oxygen diatomic where as sulphur is polyatomic.

(b) $Na_2S_2O_3 + 2H^+ \longrightarrow 2Na^+ + H_2SO_3 + S\downarrow$ (colloidal sulphur)

(c) S_2 (in vapour state) has two unpaired electrons, like O_2.

11. (A) H_2O = 273 K, H_2Te = 222 K; $\Delta_{diss}H$ (H—E()/kJ mol^{-1}

H_2O = 463 and H_2TE = 238;

(B) SO_3 = 44.8°C and SO_2 = –10.07°C, $\overset{+4}{SO_2}$, $\overset{+6}{SO_3}$

SO_3 more acidic than SO_2

(C) H_2SO_4 = 338°C; H_2O_2 = 144°C

(D) NH_3 = 238.5°C, PH_3 = 185.5°C; ↓ down the group thermal stability ↓ acidic character ↑ Reducing character.