# PHYSICAL / INORGANIC CHEMISTRY



### DPP No. 37

Total Marks: 39

Max. Time: 42 min.

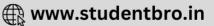
Topic: p-block elements (Nitrogen and Oxygen family)

TOPIC	. p-block elements (Mit	iogen and Oxygen ian	111y <i>)</i>			
Type of Questions Single choice Objective ('-1' negative marking) Q.1 to Q.6 Multiple choice objective ('-1' negative marking) Q.7 True or False (no negative marking) Q.8 Assertion and Reason (no negative marking) Q.9 Subjective Questions ('-1' negative marking) Q.10 Match the Following (no negative marking) Q. 11				3 marks, 3 min 4 marks, 4 min 2 marks, 2 min 3 marks, 3 min 4 marks, 5 min 8 marks, 10 mi	.) [4, 4] .) [2, 2] .) [3, 3] .) [4, 5]	
1.	<ul> <li>(a) Which one of the following reactions will give oxygen gas?</li> <li>(A) A reaction of PbO<sub>2</sub> with concentrated HNO<sub>3</sub>. (B) A reaction of MnO<sub>2</sub> with concentrated H<sub>2</sub>SO<sub>4</sub>.</li> <li>(C) A reaction of KMnO<sub>4</sub> with concentrated HCI. (D) (A) and (B) both</li> <li>(b) Which of the following statement is correct?</li> <li>(A) AI<sub>2</sub>O<sub>3</sub>, ZnO, TeO<sub>2</sub> and Sb<sub>2</sub>O<sub>3</sub> are amphoteric oxides.</li> <li>(B) Super oxides dissolve in water forming hydrogen peroxide and liberating oxygen gas.</li> <li>(C) CrO<sub>3</sub>, Mn<sub>2</sub>O<sub>7</sub>, P<sub>4</sub>O<sub>10</sub> and CI<sub>2</sub>O<sub>7</sub> are acidic oxides.</li> <li>(D) All of these.</li> </ul>					
2.	Which of the following is used as a bleaching agent ?					
	(A) Hydrogen peroxide	(B) Ozone	(C) calgon	(D) (A) a	ind (B) both	
3.	(a) The oxidation number of sulphur in S <sub>2</sub> Cl <sub>2</sub> , SF <sub>4</sub> and S <sub>8</sub> respectively are :					
	(A) +1, + 4 and 0	(B) + 2, + 4 and – 2	(C) 0, + 4 and –	1 (D) 0, +	(D) 0, + 4 and 0	
	(b) H <sub>2</sub> S cannot be dried by :					
	(A) anhydrous CaCl <sub>2</sub>	(B) $P_2O_5$	(C) Conc. H <sub>2</sub> SO <sub>4</sub>	(D) All of	fthese	
4.	(a) Hot concentrated s (A) SO <sub>3</sub>	ulphuric acid dissolves s (B) SO <sub>2</sub>	sulphur forming (C) H <sub>2</sub> SO <sub>3</sub>	(D) H <sub>2</sub> S <sub>2</sub>	O <sub>3</sub>	
	(b) $KCIO_3 + H_2SO_4 \xrightarrow{\Delta} KHSO_4 + HCIO_4 + (X) + H_2O$ . The product [X] is:					
	(A) O <sub>2</sub>	(B) Cl <sub>2</sub>	(C) CIO <sub>2</sub>	(D) Cl <sub>2</sub> O	3	
5.	<ul> <li>Which of the following statement is false for sulphurdioxide?</li> <li>(A) It reacts with dry chlorine in presence of charcoal to form sulphuryl chloride.</li> <li>(B) It reduces KIO<sub>3</sub> to iodine in acidic medium.</li> <li>(C) It when passed through a solution of sodium sulphide, produces Na<sub>2</sub>SO<sub>3</sub>.</li> <li>(D) It oxidises SnCl<sub>2</sub> to SnCl<sub>4</sub> in presence of HCI.</li> </ul>					
6.	(a) Consider the following statements  (i) Sulphur dioxide exists as discrete SO, molecules in gaseous as well as solid state.					

- (i) Sulphur dioxide exists as discrete SO<sub>2</sub> 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)  $S_2 O_6^{2-}$  contains –O–O– linkage.
- (C) (HPO<sub>3</sub>)<sub>3</sub> contains P P linkage
- (D) S<sub>2</sub>O<sub>8</sub><sup>2-</sup> contains S–S linkage





- 7. (a) Aqueous solution of hydrogen peroxide: (A) turns blue litmus pink (D) bleaches blue litmus.
  - (B) gives bright blue colour in ether with acidified K<sub>2</sub>Cr<sub>2</sub>O<sub>2</sub> solution.
  - (C) gives yellow or orange coloured solution with an acidified solution of titanium salt.
  - (b) Which of the following statement(s) is / are true for the hydrides of the elements of 16th group?
  - (A) Their acidic character increases from H<sub>2</sub>O to H<sub>2</sub>Te
  - (B) Their thermal stability increases from H<sub>2</sub>O to H<sub>2</sub>Te
  - (C) Their reducing character increases from H<sub>2</sub>S to H<sub>2</sub>Te
  - (D) The order of their boiling points is H<sub>2</sub>S < H<sub>2</sub>Se < H<sub>2</sub>Te < H<sub>2</sub>O
  - 8. (a) Consider the following statements
    - **S**<sub>1</sub>: (HPO<sub>2</sub>)<sub>n</sub> can be prepared by heating phosphorus acid and bromine in a sealed tube.
    - **S<sub>2</sub>:** Dry iodine reacts with ozone and forms a yellow solid, I<sub>4</sub>O<sub>0</sub>.
    - **S**<sub>3</sub>:  $\beta$ -Sulphur is stable below 369 K.

and arrange in the order of true/false.

- (A) FTF
- (B) TTF
- (C) TTT
- (D) TFF

- (b) True / false.
- **S**<sub>a</sub>: Sodium thiosulphate with FeCl<sub>a</sub> solution develops a pink or violet colour which soon vanishes.
- **S<sub>2</sub>:** White precipitate of PbS<sub>2</sub>O<sub>3</sub> 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 ?  $S_g$ ,  $S_g$  and  $S_g$ .
- 11. Match the following (one or more then one)

#### Column - I

Column - II

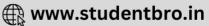
- (A)  $H_a$ Te  $< H_a$ O
- (p) Boiling point
- (B) SO<sub>2</sub> < SO<sub>3</sub>
- (q) Thermal stability
- (C)  $H_2O_2 < H_2SO_4$
- (r) Acidic character
- (D)  $PH_3 < NH_3$
- (s) Reducing character

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- 1. (a) (D) (b) (D) 2.
- (D)
- 3. (a) (A) (b) (C) 4.
- (a) (B) (b) (C) 5.
- (C)

- (a) (C) (b) (A) 6.
- 7. (a) (B,C,D)
- (b) (A,C,D)

- (a)
- (B) (b)
- S,: (True); S,: (false)
- (D)
- 10. On the basis of atomicity, oxygen diatomic where as sulphur is polyatomic. (a)
  - $Na_2S_2O_3 + 2H^+ \longrightarrow 2Na^+ + H_2SO_3 + S\downarrow$  (colloidal sulphur) (b)
  - S<sub>2</sub> (in vapour state) has two unpaired electrons, like O<sub>2</sub>
- 11. (A - p, q); (B - p, q, r) (C - p, q, r); (D - p, q)



## **Hints & Solutions**

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1. (a) 
$$PbO_2 + 2HNO_3 \longrightarrow Pb(NO_3)_2 + 1/2 O_2 + H_2O$$
  
 $2MnO_2 + 2H_2SO_4 \longrightarrow 2MnSO_4 + H_2O + O_2$   
 $2 KMNO_4 + 16HCI \longrightarrow 2KCI + 2MnCI_2 + 8H_2O + 5CI_2$ 

- (A) and (B). Source NCERT
- 3. **(b)**  $H_2S + H_2SO_4 \longrightarrow 2H_2O + SO_2 + S$
- 5.  $2Na_2S(aq) + 3SO_2(g) \longrightarrow S \downarrow + Na_2S_2O_3(aq)$
- (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.
- (a) S<sub>1</sub> (NCERT), S<sub>3</sub> 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.
- (a) on the basis of atomicity, oxygen diatomic where as sulphur is polyatomic.
  - (b) Na,S,O, + 2H+ → 2Na+ + H,SO, + S↓ (colloidal sulphur)
  - (c) S<sub>2</sub> (in vapour state) has two unpaired electrons, like O<sub>2</sub>.
- 11. (A)  $H_2O = 273 \text{ K}$ ,  $H_2Te = 222 \text{ K}$ ;  $\Delta_{diss}H (H—E()/kJ \text{ mol}^{-1} H_2O = 463 \text{ and } H_2TE = 238$ ;
  - (B)  $SO_3 = 44.8^{\circ}C$  and  $SO_2 = -10.07^{\circ}C$ ,  $SO_2^{+4}$ ,  $SO_3^{+6}$

SO, more acidic than SO,

- (C) H,SO, = 338°C; H,O, = 144°C
- (D) NH<sub>3</sub> = 238.5°C, PH<sub>3</sub> = 185.5°C; ↓ down the group thermal stability ↓ acidic character ↑ Reducing character.



