

2022

Time : 3 hours

Full Marks : 60 (40)

Candidates are required to give their answers

in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer any five questions in

which questions no 1 is compulsory.

1. Choose the correct alternative for each of the following questions : 1×12=12

(a) What of the following is the conjugate base of HCO_3^- ?

(i) H_2CO_3

✓(ii) CO_3^{2-}

(iii) CO_2

(iv) None of these

(b) Which of the following is the strongest Lewis acid ?

✓(i) BF_3

(ii) BCl_3

(iii) BBr_3

(iv) BI_3

(c) Which of the following does not show diagonal relationship ?

(i) Li

✓(ii) Be

(iii) B

(iv) None of these

(d) H_2O is _____ at room temperature but

H_2S is _____.

(i) Gas, Liquid

(ii) Liquid, Gas

(iii) Liquid, Solid

(iv) Solid, Liquid

(e) B_2H_6 acts as a :

(i) Lewis acid

(ii) Lewis base

(iii) Oxidising agent

(iv) None of these

(f) H_2SO_5 is a :

(i) Monobasic acid

(ii) Dibasic acid

(iii) Tribasic acid

(iv) None of these

(g) N_2O is a _____ oxide but Na_2O is a _____ oxide.

(i) Basic, Acidic

(ii) Amphoteric, Basic

(iii) Acidic, Basic

(iv) None of the these

(h) The compound having S-S single bond is :

(i) $H_2S_2O_3$

(ii) $H_2S_2O_4$

(iii) $H_2S_2O_7$

(iv) $H_2S_2O_8$

(i) Which of the following show the maximum inert pair effect ?

(i) Ge

(ii) Pb

(iii) Si

(iv) Sn

(j) The general formula of Silane is :

(i) $\text{Si}_n\text{H}_{2n+2}$

(ii) $\text{Si}_n\text{H}_{2n+1}$

(iii) $\text{Si}_n\text{H}_{n+2}$

(iv) Si_nH_{2n}

(k) NO_2 is :

(i) Linear

(ii) Paramagnetic

(iii) Basic

(iv) Diamagnetic

(l) The reaction of XeF_6 with water is....

(i) Reduction reaction

(ii) Oxidation reaction

(ii) Redox reaction

(iv) None of these

2. Describe the Lowry Bronsted theory of acids and bases with examples. How are Lewis acids classified ?

6+6=12

3. (a) What are different types of acid base reactions? Explain giving suitable examples.

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(b) Arrange the following bases in increasing order of basic strength giving proper reasons. $\text{Al}(\text{OH})_3$, LiOH , $\text{Mg}(\text{OH})_2$, KOH , NaOH .

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4. Why are noble gases inert? Using VSEPR theory, predict the molecular geometry and draw structure of any three of the following: XeF_2 , XeF_4 , XeF_6 , XeO_3 , XeO_2F_2

3+9=12

5. Discuss the preparation, structure, bonding and chemical reactions of diborane. 12
6. (a) What is inert pair effect? Discuss its consequences. 6
- (b) Discuss the allotropy in Carbon, Sulphur or Phosphorus. 6
7. Discuss the general methods of preparation, structure and chemical reactions of interhalogen compounds. 12
8. Explain any four of the following giving appropriate reasons : 3×4=12
- (a) PbO_2 acts as an oxidising agent.
- (b) Interhalogen compounds are more reactive than halogens.
- (c) Chemical reactivity of alkali metals increases from Li to Cs.

(d) Beryllium resembles more with aluminum than with alkaline earth metals.

SnCl_2 acts as a reducing agent.

CCl_4 is not hydrolyzed with water while

SiCl_4 is readily hydrolysed.

Write down short notes on any three of the following : 4×3=12

(a) Levelling solvents

(b) Diagonal Relationship

(c) Anomalous behavior of Lithium

(d) Ionic hydrides

(e) Pseudohalogens

(f) Oxoacids of Nitrogen

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