



Max Marks:60

5.

Date: 13.08.2022

ARJUNA BATCH CHEMISTRY: DCT Topic: Halogen+Zero+Solution

- 1. A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with NH₃ an unstable trihalide is formed. In this process the oxidation state of nitrogen changes from _____. (a) -3 to +3 (b) -3 to 0 (c) -3 to +5 (d) 0 to -3
- 2. In the preparation of compounds of Xe, Bartlett had taken O_2^+ Pt F_6^- as a base compound. This is because
 - (a) both O_{2+} and Xe have same size
 - (b) both O_2 and Xe have same electron gain enthalpy.
 - (c) both O_2 and Xe have almost same ionisation enthalpy.
 - (d) both Xe and O_2 are gases.
- 3. In solid state PCl₅ is a _____
 - (a) covalent solid
 - (b) octahedral structure
 - (c) ionic solid with $[PCl_6]^+$ octahedral and $[PCl_4]^-$ tetrahedra
 - (d) ionic soild with $[PCl_4]^+$ tetrahedral and $[PCl_6]^-$ octahedra
- 4. Reduction potentials of some ions are given below. Arrange them in decreasing order of oxidizing power.

	Ion		lO_{4}^{-}	lO_4^-		BrO_4^-		
	Reduction		19V	1.65 V		1.74V		
	Potential E ^v /V							
(a)	$ClO_4^- > lO_4^- > BrO_4^-$				(b)	<i>l0</i> ₄ -> <i>Br0</i> ₄ -> <i>Cl0</i> ₄ -	1	
(c)	$BrO_{4}^{-} > lO_{4}^{-} > ClO_{4}^{-}$				(d)	$BrO_4^- > ClO_4^- > lO_4^-$	D_{4}^{-}	
Whicl	h of the following is is	oelectr	onic pair	?				
(a)	ICl ₂ , ClO ₂	(b)	Br0 ⁻ ₂ ,	BrF_2^-	(c)	ClO ₂ , BrF	(d)	CN^{-} , O_3





- (a) HI > HBr > HCl > HF: Acidic property in water
 - (b) $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity
 - (c) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
 - (d) $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power.
- 7. The correct order of increasing bond angles in the following species is :
 - (a) $\operatorname{Cl}_2 O < \operatorname{Cl}_2 O < \operatorname{Cl}_2 < \operatorname{Cl}_2$ (b) $\operatorname{Cl}_2 O < \operatorname{Cl}_2 O < \operatorname{Cl}_2$
 - (c) $Cl_2O < ClO_2 < ClO_2^-$ (d) $ClO_2 < Cl_2O < ClO_2^-$
- 8. When Cl₂ gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from
 - (a) zero to + 1 and zero to -5 (b) zero to -1 and zero to +5
 - (c) zero to -1 and zero to +3 (d) zero to +1 and zero to -3
- 9. Which of the following statement is true?
 - (a) In aqueous medium, HF is a stronger acid than HCl
 - (b) $HClO_4$ is a weaker acid than $HClO_3$
 - (c) HNO_3 is a stronger acid than HNO_2
 - (d) H_3PO_5 is a stronger acid than H_2SO_3 .

10. A 0.004 M solution of Na₂SO₄ is isotonic with 0.010 M solution of glucose at the same temperature. The apparent percentage dissociation of Na₂SO₄ is

- (a) 25% (b) 50% (c) 75% (d) 85%
- 11. When 20 g of naphthoic acid ($C_{11}H_8O_2$) is dissolved in 50 g of benzene (K = 1.72 K kg mol⁻¹) a freezing point depression of 2 K is observed. The Van't Hoff factor 'i' is (a) 0.5 (b) 1 (c) 2 (d) 3
- 12. The freezing point (in °C) of a solution containing 0.1 g of $K_3[Fe(CN)_6]$ (mol. Wt. 329) in 100 g of water ($K_f = 1.86 \text{ K kg mol}^{-1}$) is (a) -2.3×10^{-2} (b) -5.7×10^{-2} (c) -5.7×10^{-3} (d) -1.2×10^{-2}





Single Digit Answer

13. How many of the following solutions show negative deviation from ideal behaviour?

Chloroform + diethyl ether, acetone + aniline, water + nitric acid, acetone + ethyl alcohol, acetone + carbon disulphide, chloroform + nitric acid

0	1	2	3	4	5	6	7	8	9

14. Which of the following solution will boil above 373 K ? 0.1 M NaCl, 0.1 M Glucose, 0.1 M BaCl₂ solution, 0.1 M Sucrose, 0.1M KNO₃ 0.1M Na₂SO₃, 0.1 M K₄ [Fe(CN)₆], 0.1 M K₂ CO₃.

0	1	2	3	4	5	6	7	8	9	
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15. How many of the following concentration units are independent of temperature? Molarity, mole fraction, normality, formality, molality Vol % mass%

0	1	2	3	4	5	6	7	8	9
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ARJUNA BATCH MATHEMATICS : DCT Topic: Inverse Trigo Function

16.	If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = 3\pi$, then : $x(y + z) + y(z + x) + z(x + y) =$									
	(a)	0	(b)	1	(c)	6	(d)	12		
17.	If cos ⁻	$\sqrt{1}\sqrt{p} + \cos^{-1}\sqrt{1-p} + cos^{-1}\sqrt{1-p}$	$-\cos^{-1}\sqrt{2}$	$\overline{1-q} = \frac{3\pi}{4}$, then $q =$						
	(a)	1	(b)	$\frac{1}{\sqrt{2}}$	(c)	$\frac{1}{3}$	(d)	$\frac{1}{2}$		
18.	sin{ta	$\mathbf{n}^{-1}\left[\frac{1-\mathbf{x}^2}{2\mathbf{x}}\right] + \cos^{-1}\left[\frac{1-\mathbf{x}^2}{2\mathbf{x}}\right]$	$\left[\frac{1-x^2}{1+x^2}\right]$	}=						
	(a)	0	(b)	1	(c)	$\sqrt{2}$	(d)	$\frac{1}{\sqrt{2}}$		
19.	If sin ⁻¹	$x + \sin^{-1}y = \frac{2\pi}{3}, \text{ the}$	en : cos-	$^{1}x + \cos^{-1}y = \dots$						
	(a)	$\frac{2\pi}{3}$	(b)	$\frac{\pi}{3}$	(c)	$\frac{\pi}{6}$	(d)	π		
20.	A solu	tion of the equation	tan ⁻¹ (1 -	$(+x) + \tan^{-1}(1-x) = \frac{\pi}{2}$	$\frac{\tau}{2}$ is					
	(a)	x = 1	(b)	x = -1	(c)	$\mathbf{x} = 0$	(d)	$\mathbf{x} = \boldsymbol{\pi}$		



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21.	If sin ⁻¹	$x = \frac{\pi}{5}$ for some $x \in$	≡ (−1,1),	then : $\cos^{-1}x =$				
	(a)	$\frac{3\pi}{10}$	(b)	$\frac{5\pi}{10}$	(c)	$\frac{7\pi}{10}$	(d)	$\frac{9\pi}{10}$
22.	$\tan^{-1}\left(\frac{1}{2}\right)$	$\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right) =$:					
	(a)	$\frac{\pi}{2}$	(b)	$\frac{\pi}{3}$	(c)	$\frac{\pi}{4}$	(d)	$\frac{\pi}{4}$ or $\frac{3\pi}{4}$
23.	The do	main of the function	f(x) =	$\frac{\sqrt{9-x^2}}{\sin^{-1}(3-x)}$ is				
	(a)	(2,3)	(b)	[2, 3)	(c)	(2,3]	(d)	none of these
24.	The do	main of the function	f(x) =	$\sqrt{3-x} + \cos^{-1}\left(\frac{3-2x}{5}\right)$	$\left(\frac{1}{2}\right)$ is			
	(a)	[-1, 3]	(b)	(-1,3]	(c)	[-1, 3)	(d)	none of these
25.	The do	main of the function	f(x) =	$\cos^{-1}\left(\frac{2- x }{4}\right) + \frac{1}{\log(2)}$	$\frac{1}{3-x}$ is			
	(a)	[-6, 3) - {2}	(b)	$[-6,3) \cup (2,3]$	(c)	[-6, 3]	(d)	[-6, 2]
26.	The do	main of the function	f(x) =	$\sin^{-1}\left(\frac{x-3}{2}\right) - \log_{10}(4)$	1–x) is			
	(a)	(1, 4)	(b)	[1, 4]	(c)	[1, 4)	(d)	(1, 4]



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27. The domain of the function
$$f(x) = \sqrt[3]{1-3x} + 3\cos^{-1}\left(\frac{2x-1}{3}\right) + e^{3\tan x}$$
 is
(a) [-1, 2] (b) (-1, 2) (c) R (d) none of these
28. The domain of the function $f(x) = \sqrt{\cos^{-1}\left(\frac{1-|x|}{2}\right)}$ is
(a) $(-\infty, -3) \cup (3, \infty)$ (b) [-3, 3] (c) $(-\infty, -3) \cup [3, \infty)$ (d) {}
29. The domain of the function $f(x) = \sqrt{\sin^{-1}(\log_2 x)}$ is
(a) $(1, 2)$ (b) [1, 2) (c) $(1, 2]$ (d) [1, 2]
30. The range of the function $\sin^{-1}\left(\frac{x^2}{1+x^2}\right)$ is
(a) $\left(0, \frac{\pi}{2}\right)$ (b) $\left[0, \frac{\pi}{2}\right]$ (c) $\left[0, \frac{\pi}{2}\right]$ (d) none of these



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1.	(a)	2.	(c)	3.	(d)	4.	(c)	5.	(b)
6.	(c)	7.	(b)	8.	(b)	9.	(c)	10.	(c)
11.	(a)	12.	(a)	13.	(4)	14.	(8)	15.	(3)

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16.	(c)	17.	(d)	18.	(b)	19.	(b)	20.	(c)
21.	(a)	22.	(c)	23.	(b)	24.	(a)	25.	(a)
26.	(c)	27.	(a)	28.	(b)	29.	(d)	30.	(b)