



# BJNP

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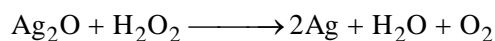


Max. Marks: 200

Date: 21.08.2022

**JB 3 MR BATCH**  
**CHEMISTRY : PART TEST**  
**Topic: s-block (Hydrogen)**

1. In the reaction,



$\text{H}_2\text{O}_2$  acts as

- (a) reducing agent      (b) oxidizing agent      (c) bleaching agent      (d) None of these

2. Consider the following Assertion (A) and Reason (R) and choose the correct option.

Assertion (A)  $\text{H}_2\text{O}_2$  undergoes disproportionation on heating.

Reason (R) It gives  $\text{H}_2\text{O}$  and  $\text{O}_2$  on heating.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)  
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A)  
(c) (A) is true but (R) is false  
(d) Both (A) and (R) are false

3. (A)  $\text{H}_2\text{O}_2 + \text{O}_3 \longrightarrow \text{H}_2\text{O} + 2\text{O}_2$

(B)  $\text{H}_2\text{O}_2 + \text{Ag}_2\text{O} \longrightarrow 2\text{Ag} + \text{H}_2\text{O} + \text{O}_2$ ,  $\text{H}_2\text{O}_2$  is

- (a) Oxidising agent in (A) and reducing agent in (B)  
(b) Reducing agent in (A) and oxidizing agent in (B)  
(c) Reducing agent in (A) and (B)  
(d) Oxidising agent in (A) and (B)

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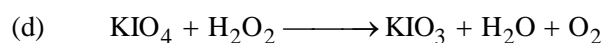
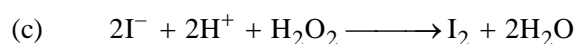
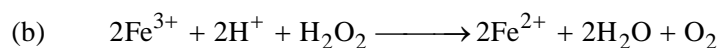
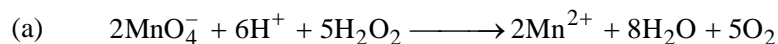


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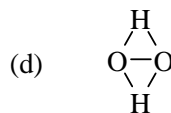
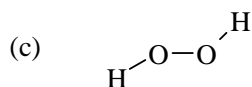
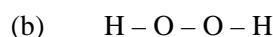
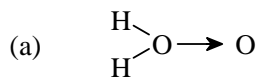
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4. Which of the following equations depict the oxidizing nature of  $\text{H}_2\text{O}_2$ ?



5. What is the structure of  $\text{H}_2\text{O}_2$ ?



6. Polyphosphates are used as water softening agents because they

(a) form soluble complexes with anionic species (b) precipitate anionic species

(c) form soluble complexes with cationic species (d) precipitate cationic species

7. The adsorption of hydrogen by metals is called

(a) chemisorptions (b) occlusion (c) hydrogenation (d) dehydrogenation

8. When electric current is passed through an ionic hydride in the molten state

(a) hydrogen is liberated at the cathode (b) hydrogen is liberated at the anode

(c) no reaction take place (d) hydride ion migrates towards cathode

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9. Hydrogen usually has an oxidation state of + 1 in combined state. Exception to this statement include  
(a) hydrocarbon (b) metal hydrides (c) ammonia (d) All of these
10. An element reacts with hydrogen to form a compound A which on treatment with water liberates hydrogen gas. The element can be  
(a) Cl (b) Se (c) N (d) Ca
11. Pick out the correct statement  
(a) By decreasing the temperature pure para-hydrogen can be obtained  
(b) By increasing the temperature pure ortho-hydrogen can be obtained  
(c) By decreasing the temperature pure ortho-hydrogen can be obtained  
(d) By increasing the temperature pure para-hydrogen can be obtained
12. Deuterium resembles hydrogen in chemical properties but reacts  
(a) More vigorously than hydrogen (b) Faster than hydrogen  
(c) Slower than hydrogen (d) Just as hydrogen
13. Match list I with list II and select the correct answer using the codes given below the lists
- | List I                  | List II   |
|-------------------------|---|
| 1. Heavy water          | (a) Bicarbonates of Mg and Ca in water            |
| 2. Temporary hard water | (b) No foreign ions in water                      |
| 3. Soft water           | (c) D <sub>2</sub> O                              |
| 4. Permanent hard water | (d) Sulphates and chlorides of Mg and Ca in water |
- Codes:
- |                                |                                |
|--------------------------------|--------------------------------|
| (a) 1 – c, 2 – d, 3 – b, 4 – a | (b) 1 – b, 2 – a, 3 – c, 4 – d |
| (c) 1 – b, 2 – d, 3 – c, 4 – a | (d) 1 – c, 2 – a, 3 – b, 4 – d |

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14. Why do calcium ions make water hard but sodium ions do not
- (a) Calcium forms insoluble compounds with stearate ions present in soap
  - (b) Sodium forms insoluble compounds with stearate ions present in soap
  - (c) Calcium forms soluble compounds with stearate ions present in soap
  - (d) Both calcium and sodium forms insoluble compounds with stearate ions present in soap
15. Chemical A is used for water softening to remove temporary hardness. A reacts with sodium carbonate to generate caustic soda. When  $\text{CO}_2$  is bubbled through a solution of A, it turns cloudy. What is the chemical formula of A
- (a)  $\text{CaCO}_3$
  - (b)  $\text{CaO}$
  - (c)  $\text{Ca(OH)}_2$
  - (d)  $\text{Ca(HCO}_3)_2$
16. Synthetic detergents are more effective in hard water than soaps because
- (a) They are highly soluble in water
  - (b) Their  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  salts are water soluble
  - (c) Their  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  salts are insoluble in water
  - (d) None of these
17. Permutit is technical name given to
- (a) Alumintes of calcium and sodium
  - (b) Silicates of calcium and sodium
  - (c) Hydrated silicates of aluminium and sodium
  - (d) Silicates of calcium and magnesium
18. Consider the reactions
- (i)  $\text{H}_2\text{O}_2 + 2\text{HI} \longrightarrow \text{I}_2 + 2\text{H}_2\text{O}$
  - (ii)  $\text{HOCl} + \text{H}_2\text{O}_2 \longrightarrow \text{H}_3\text{O}^+\text{Cl}^- + \text{O}_2$
- Which of the following statements is correct about  $\text{H}_2\text{O}_2$  with reference to these reactions? Hydrogen peroxide is
- (a) An oxidizing agent in both (i) and (ii)
  - (b) An oxidizing agent in (i) and reducing agent in (ii)
  - (c) A reducing agent in (i) and oxidizing agent in (ii)
  - (d) A reducing agent in both (i) and (ii)

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19. Assertion: Calgon is used for removing  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  ions from hard water.  
Reason: Calgon forms precipitates with  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$
- (a) If both assertion and reason are true and the reason is the correct explanation of the assertion.  
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.  
(c) If assertion is true but reason is false.  
(d) If the assertion and reason both are false.  
(e) If assertion is false but reason is true.
20. Hydrogen peroxide can be prepared from
- (a) NaOH                      (b)  $\text{BaO}_2 \cdot 8\text{H}_2\text{O}$                       (c)  $\text{Ca}(\text{OH})_2$                       (d)  $\text{Na}_2\text{O}$
21. What is the mass of hydrogen peroxide in 1 L of 3 M solution?
- (a) 10.2 g                      (b) 102 g                      (c) 11.3 g                      (d) 68 g
22. Dihydrogen react with CO at 700 K in the presence of a catalyst  $\text{ZnO}/\text{Cr}_2\text{O}_3$  to form
- (a)  $\text{CH}_4$                       (b) HCHO                      (c)  $\text{C}_6\text{H}_6$                       (d)  $\text{CH}_3\text{OH}$
23. In which of the following pair, both the hydrides are not of the same type?
- (a)  $\text{LaH}_3$ ,  $\text{TiH}_2$                       (b)  $\text{CH}_4$ ,  $\text{H}_2\text{S}$                       (c) NaH,  $\text{CaH}_2$                       (d)  $\text{BaH}_2$ ,  $\text{SiH}_4$
24. The  $\text{H}^-$  ion is stronger base than hydroxide ion. Which of the following reactions will occur if sodium hydride ( $\text{NaH}$ ) is dissolved in water?
- (a)  $\text{H}^-_{(\text{aq})} + \text{H}_2\text{O}_{(l)} \longrightarrow \text{H}_3\text{O}^+_{(\text{aq})}$                       (b)  $\text{H}^-_{(\text{aq})} + \text{H}_2\text{O}_{(l)} \longrightarrow \text{OH}^-_{(\text{aq})} + \text{H}_{2(\text{g})}$   
(c)  $\text{H}^- + \text{H}_2\text{O} \longrightarrow \text{No reaction}$                       (d) None of these
25. Commercial 11.2 volume  $\text{H}_2\text{O}_2$  solution has a molarity of
- (a) 1.0                      (b) 0.5                      (c) 11.2                      (d) 1.12

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**JB 3 MR BATCH**  
**MATHEMATICS : PART TEST**  
**Topic: Trigonometry**

26. If  $\theta = \frac{17\pi}{3}$ , then  $\tan \theta - \cot \theta = \dots$
- (a)  $\frac{1}{2\sqrt{3}}$       (b)  $\frac{-1}{2\sqrt{3}}$       (c)  $\frac{2}{\sqrt{3}}$       (d)  $-\frac{2}{\sqrt{3}}$
27. The number of values of  $x$  in the interval  $[0, 5\pi]$  satisfying the equation  $3 \sin^2 x - 7 \sin x + 2 = 0$  is ....
- (a) 6      (b) 0      (c) 2      (d) 4
28. If  $\cos \theta + \sec \theta = 2$ , then  $\sec^2 \theta - \sin^2 \theta = \dots$
- (a) 1      (b) 3      (c) 2      (d) 4
29. If  $A - B = \frac{\pi}{4}$ , then  $(1 + \tan A)(1 - \tan B) = \dots$
- (a) 1      (b) 3      (c) 2      (d) 4
30.  $\frac{2 \tan(22.5^\circ)}{1 + \tan^2(22.5^\circ)} =$
- (a)  $\frac{1}{\sqrt{2}}$       (b)  $\frac{\sqrt{3}}{2}$       (c)  $\frac{1}{2}$       (d) 1
31. The value of  $\sin 10^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ = \dots$
- (a)  $\frac{1}{6}$       (b)  $\frac{1}{8}$       (c)  $\frac{1}{2}$       (d)  $\frac{1}{3}$

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32.  $\frac{1 - 2[\cos 60^\circ - \cos 80^\circ]}{2 \sin 10^\circ} = \dots$
- (a) 1                      (b)  $\frac{3}{2}$                       (c) 2                      (d)  $\frac{1}{2}$
33. Which of the following function has period 2?
- (a)  $\cos(\pi x)$               (b)  $\cos(2\pi x)$               (c)  $\cos\left(\frac{\pi x}{2}\right)$               (d)  $\cos\left(\frac{\pi x}{3}\right)$
34. The value of  $\sin 18^\circ = \dots$
- (a)  $\frac{\sqrt{5} + 1}{4}$               (b)  $\frac{\sqrt{5} - 1}{4}$               (c)  $\frac{4}{\sqrt{5} + 1}$               (d)  $\frac{4}{\sqrt{5} - 1}$
35. In  $\triangle ABC$ , if  $\tan A + \tan B + \tan C = 6$  and  $\tan A \tan B = 2$ , then  $\tan C = \dots$
- (a) 3                      (b) 4                      (c) 1                      (d) 2
36.  $\operatorname{cosec} 2\theta - \cot 2\theta =$
- (a)  $\sin 2\theta$               (b)  $\tan 2\theta$               (c)  $\cos \theta$               (d)  $\tan \theta$
37. If  $3 \sin^2 x - 8 \sin x + 4 = 0$ ,  $x \in \left(\frac{\pi}{2}, \pi\right)$ , then  $\tan x = \dots$
- (a)  $-\frac{\sqrt{5}}{2}$               (b)  $-\frac{2}{\sqrt{5}}$               (c)  $\frac{\sqrt{5}}{2}$               (d)  $\frac{2}{\sqrt{5}}$
38. If  $\sec \theta = \frac{13}{12}$ ,  $\theta$  lies in IV<sup>th</sup> quadrant, then  $\tan \theta \times \operatorname{cosec} \theta \times \sin \theta \times \cos \theta = \dots$
- (a)  $\frac{5}{13}$                       (b)  $\frac{144}{169}$                       (c)  $-\frac{5}{13}$                       (d)  $\frac{25}{169}$

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39. If  $\tan \theta = \frac{1}{3}$ , then  $\cos 2\theta = \dots$
- (a)  $\frac{1}{10}$                       (b)  $\frac{1}{4}$                       (c)  $\frac{1}{5}$                       (d)  $\frac{4}{5}$
40.  $\cos\left(\frac{3\pi}{4} + x\right) - \sin\left(\frac{\pi}{4} - x\right) = \dots$
- (a)  $\sqrt{2} \cos x$               (b)  $\sqrt{2} \sin x$               (c)  $-\sqrt{2} \sin x$               (d)  $-\sqrt{2} \cos x$
41.  $\cos x \cdot \cos 7x - \cos 5x \cdot \cos 13x = \dots$
- (a)  $2 \sin 6x \cdot \cos 12x$     (b)  $2 \cos^2 6x \cdot \cos 12x$     (c)  $2 \sin 6x \cdot \sin 12x$     (d)  $2 \sin^2 6x \cdot \cos 6x$
42. If  $\frac{1 - \tan \theta}{1 + \tan \theta} = \frac{1}{\sqrt{3}}$ , where  $\theta \in \left(0, \frac{\pi}{2}\right)$ , then  $\theta = \dots$
- (a)  $\frac{\pi}{4}$                       (b)  $\frac{\pi}{12}$                       (c)  $\frac{\pi}{3}$                       (d)  $\frac{\pi}{6}$
43. If  $\operatorname{cosec} \theta + \cot \theta = 5$ , then  $\sin \theta = \dots$
- (a)  $\frac{5}{13}$                       (b)  $\frac{5}{26}$                       (c)  $\frac{1}{5}$                       (d)  $\frac{1}{13}$
44. If  $2 \cos \theta = x + \frac{1}{x}$ , then  $2 \cos 3\theta = \dots$
- (a)  $x^3 + \frac{1}{x^3}$               (b)  $\left(x + \frac{1}{x}\right)^3$               (c)  $x^3 - \frac{1}{x^3}$               (d)  $x + \frac{1}{x}$
45.  $\tan A + 2 \tan 2A + 4 \tan 4A + 8 \cot 8A = \dots$
- (a)  $\cot A$                       (b)  $\tan A$                       (c)  $\tan 2A$                       (d)  $\cot 2A$

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46.  $\cos^2\left(\frac{\pi}{4} - x\right) + \sin^2\left(\frac{\pi}{4} + x\right) = \dots$   
(a) 2 (b)  $\cos x$  (c)  $\sin x$  (d) 1
47. If  $a \sin \theta = b \cos \theta$ ,  $a, b \neq 0$ , then  $a \cos 2\theta + b \sin 2\theta = \dots$   
(a) a (b) b (c)  $\frac{a}{b}$  (d) ab
48.  $\tan 3A \cdot \tan 2A \cdot \tan A = \dots$   
(a)  $\tan 3A - \tan 2A + \tan A$  (b)  $\tan 3A + \tan 2A + \tan A$   
(c)  $\tan 3A - \tan 2A - \tan A$  (d)  $\tan 3A + \tan 2A - \tan A$
49. If  $3 \sin 2\theta = 2 \sin 3\theta$  and  $0 < \theta < \pi$ , then  $\sin \theta =$   
(a)  $\frac{\sqrt{15}}{4}$  (b)  $\frac{\sqrt{2}}{\sqrt{5}}$  (c)  $\frac{\sqrt{2}}{3}$  (d)  $\frac{\sqrt{3}}{\sqrt{5}}$
50. If  $\theta + \phi = \alpha$  and  $\tan \theta = k \tan \phi$  (where  $k > 1$ ), then the value of  $\sin(\theta - \phi)$  is ....  
(a)  $\left(\frac{k-1}{k+1}\right) \sin \alpha$  (b)  $k \tan \phi$  (c)  $\sin \alpha$  (d)  $k \cos \phi$

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Max. Marks : 200

Date: 21.08.2022

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**CHEMISTRY : PART TEST ANSWER KEY**  
**Topic: s-Block (Hydrogen)**

1.	(a)	2.	(a)	3.	(a)	4.	(c)	5.	(c)
6.	(c)	7.	(b)	8.	(b)	9.	(b)	10.	(d)
11.	(a)	12.	(c)	13.	(d)	14.	(a)	15.	(c)
16.	(b)	17.	(c)	18.	(b)	19.	(d)	20.	(b)
21.	(b)	22.	(d)	23.	(d)	24.	(b)	25.	(a)

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**JB 3 MR BATCH**  
**MATHEMATICS : PART TEST ANSWER KEY**  
**Topic: Trigonometry**

26.	(d)	27.	(a)	28.	(a)	29.	(c)	30.	(a)
31.	(b)	32.	(a)	33.	(a)	34.	(b)	35.	(a)
36.	(d)	37.	(b)	38.	(c)	39.	(d)	40.	(d)
41.	(d)	42.	(b)	43.	(a)	44.	(a)	45.	(a)
46.	(d)	47.	(a)	48.	(c)	49.	(a)	50.	(a)