

FIITJEE PROGRESS MONITORING TEST (FPMT-4)

ANSWER KEY

Code : 114034

Applicable for 1820 Batches (A-LOT)

PHYSICS		CHEMISTRY		MATHEMATICS	
1.	D	1.	B	1.	A
2.	A	2.	A	2.	C
3.	D	3.	C	3.	B
4.	D	4.	A	4.	A
5.	D	5.	B	5.	B
6.	D	6.	A	6.	B
7.	A	7.	A	7.	C
8.	B	8.	A	8.	B
9.	A	9.	B	9.	D
10.	C	10.	A	10.	A
11.	D	11.	B	11.	D
12.	C	12.	B	12.	D
13.	A	13.	D	13.	D
14.	B	14.	A	14.	B
15.	D	15.	A	15.	B
16.	B	16.	B	16.	B
17.	A	17.	D	17.	B
18.	D	18.	B	18.	B
19.	B	19.	B	19.	B
20.	D	20.	C	20.	B
21.	C	21.	D	21.	A
22.	A	22.	A	22.	A
23.	A	23.	B	23.	C
24.	B	24.	C	24.	B
25.	D	25.	C	25.	C
26.	D	26.	C	26.	C
27.	D	27.	C	27.	A
28.	C	28.	C	28.	C
29.	C	29.	C	29.	A
30.	B	30.	D	30.	C

Hints or Solution

Chemistry

1. From Le Chatelier's Principle, on adding NH_3 equilibrium will shift to backward direction so formation of $[\text{Cu}(\text{NH}_3)_3\text{SO}_3]$ will decrease so option B is incorrect.

2. For the reaction $2x(g) + Y(g) \rightleftharpoons 2Z(g)$ $K_c = 2.25$

$$\text{So } K_c = \frac{[Z]^2}{[X]^2[Y]}$$

$$\text{So } 2.25 = \frac{3^2}{2^2[Y]}$$

$$[Y] = 1 \text{ mole /L}$$

3. Factual

4. $\Delta n_g = -1$

5. Factual

8. $\text{CO}_2(g) + \text{H}_2(g) \rightleftharpoons \text{CO}(g) + \text{H}_2\text{O}(g)$

C	C	0	0	Initially at equilibrium total moles $\Rightarrow 2C$
C - Cx	C-Cx	Cx	Cx	

$$P_{\text{CO}_2} = \chi_{\text{CO}_2} \times P \Rightarrow \frac{1-X}{2} P = P_{\text{H}_2}$$

9. $\Delta G^\circ = -2.303 RT \log K$

If $\Delta G^\circ = 0$ then $K = 1$

11. $K_1 = \frac{[\text{SO}_3]}{[\text{SO}_2][\text{O}_2]^{1/2}}$ and $K_2 = \frac{[\text{SO}_2]^2[\text{O}_2]}{[\text{SO}_3]^2}$

$$\text{So } K_2 = \frac{1}{K_1^2} = \frac{1}{(4 \times 10^{-3})^2} = 6.25 \times 10^4$$

13. $2\text{HI}(g) \rightleftharpoons \text{H}_2(g) + \text{I}_2(g)$

C-C α	$\frac{C\alpha}{2}$	$\frac{C\alpha}{2}$
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$$P_{\text{H}_2} = P_{\text{I}_2} = \frac{C\alpha/2}{2} \cdot P = \frac{\alpha}{2} \cdot P$$

$$P_{\text{HI}} = (1-\alpha)P \quad \text{Now } K_P = \frac{\left(\frac{\alpha}{2} \cdot P\right)^2}{[(1-\alpha)P]^2}$$

$$\sqrt{K_P} = \frac{\alpha}{(1-\alpha)2}$$

$$\frac{\alpha}{1-\alpha} = 2\sqrt{K_P}$$

$$\text{Or } (1+2\sqrt{K_P})\alpha = 2\sqrt{K_P}$$

$$\alpha = \frac{2\sqrt{K_P}}{1+2\sqrt{K_P}}$$

14. $\text{H}_2\text{O}(g) + \text{CO}(g) \rightleftharpoons \text{H}_2(g) + \text{CO}_2(g)$

1	1	0	0	(Initially) equilibrium
1 - 0.4	1 - 0.4	0.4	0.4	

$$\text{So } K_c = \frac{\left(\frac{0.4}{5}\right)\left(\frac{0.4}{5}\right)}{\left(\frac{0.6}{5}\right)\left(\frac{0.6}{5}\right)} = 0.444$$

15. $K_1 = 10^x = [K^+][Cl^-]$

$$K_2 = 10^y = \frac{1}{[Ag^+][Cl^-]}$$

Equilibrium constant for the reaction $K_3 = \frac{[K^+]}{[Ag^+]} = K_1 \cdot K_2 = 10^{x+y}$

16. $\Delta G^\circ = -RT \ln K_p = -RT \ln P_{CO_2}$

23. Factual

29. In presence of catalyst equilibrium can be achieved easily.

FIITJEE PROGRESS MONITORING TEST (FPMT-4)

ANSWER KEY

Code : 114035

Applicable for 1820 Batches (B01)

PHYSICS		CHEMISTRY		MATHEMATICS	
1.	C	1.	B	1.	B
2.	A	2.	A	2.	B
3.	A	3.	C	3.	C
4.	D	4.	A	4.	C
5.	C	5.	B	5.	B
6.	C	6.	A	6.	C
7.	D	7.	A	7.	C
8.	B	8.	A	8.	A
9.	C	9.	B	9.	B
10.	A	10.	A	10.	B
11.	B	11.	B	11.	C
12.	A	12.	B	12.	C
13.	D	13.	D	13.	A
14.	C	14.	A	14.	B
15.	D	15.	A	15.	A
16.	C	16.	B	16.	B
17.	B	17.	D	17.	D
18.	A	18.	B	18.	B
19.	A	19.	B	19.	B
20.	C	20.	C	20.	A
21.	B	21.	D	21.	B
22.	D	22.	A	22.	C
23.	C	23.	B	23.	B
24.	C	24.	C	24.	B
25.	C	25.	C	25.	B
26.	C	26.	C	26.	A
27.	A	27.	C	27.	A
28.	B	28.	C	28.	B
29.	B	29.	C	29.	C
30.	A	30.	D	30.	B

HINTS OR SOLUTIONS
PHYSICS

1. C

$$F_{\text{avg}} = \frac{2mv \sin \theta}{t} = \frac{2 \times 3 \times 10 \sin 60^\circ}{0.2} = 150\sqrt{3} \text{ N}$$

2. A

Before explosion, particle was moving along x-axis, i.e., it has no y-component of velocity. Therefore, the centre of mass will not move in y-direction or we can say $y_{\text{com}} = 0$.

$$\text{Now, } y_{\text{com}} = \frac{m_1 y_1 + m_2 y_2}{m_1 + m_2} \Rightarrow 0 = \frac{(m/4)(+15) + (3m/4)(y)}{(m/4 + 3m/4)} \quad \text{or} \quad y = -5\text{cm}$$

3. A

$$\begin{aligned} \text{Impulse} &= \left(\begin{array}{l} \text{Area of force-time graph} \\ \text{under the specified interval} \end{array} \right) \\ &= \frac{1}{2}(800 + 200) \times 2 \times 10^{-6} + \frac{1}{2} \times 800 \times 10 \times 10^{-6} = 5 \times 10^{-3} \text{ N-s} \end{aligned}$$

4. D

Since no external force acts, initially both particle at rest. So speed of centre of mass of system is zero.

5. C

Let man moves distance x relative to ground. The distance moved by Planck is $(L - x)$. As no external force acts, so centre of mass should not change.

$$\begin{aligned} Mx &= \frac{M}{3}(L - x) \\ \Rightarrow \left(M + \frac{M}{3} \right) x &= \frac{M}{3}L \\ \frac{4M}{3}x &= \frac{M}{3}L \\ \Rightarrow x &= \frac{L}{4} \end{aligned}$$

6. C P110606/P110607

Collision is elastic. So, velocity of separation = velocity of approach. So, relative velocity before and after collision remains same.

\therefore Time in which the next collision will take place

$$\frac{2\pi R}{V}$$

7. D

Maximum loss in kinetic energy when, $e = 0$

8. B

$$x_2 = \frac{\sigma \pi c b^2}{\sigma \pi (a^2 - b^2)}$$

9. C

$$v_{\text{cm}} = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2} = \frac{10 \times 14 + 4 \times 0}{14} = 10 \text{ m/s}$$

10. A

$$e = \frac{p_2^f - p_1^f}{p_1^i - p_2^i} = \frac{J - (P - J)}{P}$$

11. B

$$e = \frac{12 - 10}{10 - v}$$

$$10 - v = 2 \Rightarrow v = 8 \text{ m/s}$$

12.

A

From conservation of momentum $mv_0 = mv' + 2mv'$

From conservation of energy $\frac{1}{2}mv_0^2 = \frac{1}{2}kx^2 + \frac{1}{2}(3m)\left(\frac{v_0}{3}\right)^2$

$$v_0 \sqrt{\frac{2m}{3k}} = x$$

13.

D

$$v_{\text{CM}} = \frac{20 - 6}{7} = 2 \text{ m/s} \quad \dots\dots\dots \text{(i)}$$

$$\frac{1}{2}5(4)^2 + \frac{1}{2}(2)(3)^2 = \frac{1}{2}5v_1^2 + \frac{1}{2}2v_2^2 \quad \dots\dots\dots \text{(ii)}$$

$$v_{\text{CM}} = 2 = \frac{5v_1 + 2v_2}{7} \quad \dots\dots\dots \text{(iii)}$$

Solving (ii) and (iii), we lead to desired result.

Chemistry

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C C 0 0 Initially
C - C x C-Cx Cx Cx at equilibrium total moles $\Rightarrow 2C$

$$P_{\text{CO}_2} = \chi_{\text{CO}_2} \times P \Rightarrow \frac{1-x}{2}P = P_{\text{H}_2}$$

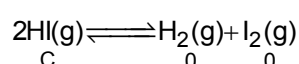
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13.



$$C-C\alpha \quad \frac{C\alpha}{2} \quad \frac{C\alpha}{2}$$

$$P_{H_2} = P_{I_2} = \frac{C\alpha/2}{2} \cdot P = \frac{\alpha}{2} \cdot P$$

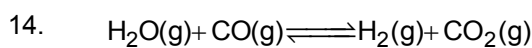
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$$\text{Or } (1+2\sqrt{K_P})\alpha = 2\sqrt{K_P}$$

$$\alpha = \frac{2\sqrt{K_P}}{1+2\sqrt{K_P}}$$



1	1	0	0	(Initially)
1 - 0.4	1 - 0.4	0.4	0.4	equilibrium

$$\text{So } K_c = \frac{\left(\frac{0.4}{5}\right)\left(\frac{0.4}{5}\right)}{\left(\frac{0.6}{5}\right)\left(\frac{0.6}{5}\right)} = 0.444$$

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