

# DPP

DAILY PRACTICE PROBLEMS

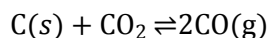
Class : XIth  
Date :

## Solutions

Subject : CHEMISTRY  
DPP No. : 2

### Topic :- Equilibrium

- 1 (c)  
 $\text{Fe}^{3+} + 3\text{H}_2\text{O} \rightarrow \text{Fe}(\text{OH})_3 + 3\text{H}^+$
- 2 (b)  
This is Bronsted-Lowry concept of acid base.
- 3 (a)  
The conjugate acids of  $\bar{\text{O}}\text{H}, \bar{\text{N}}\text{H}_2, \text{HC} \equiv \text{C}^-$  and  $\text{CH}_3\text{CH}_2^-$  are  $\text{H}_2\text{O}, \text{NH}_3, \text{HC} = \text{CH}$  and  $\text{CH}_3 - \text{CH}_3$  respectively. Their acidic strength is as  $\text{HOH} > \text{HC} \equiv \text{CH} > \text{NH}_3 > \text{CH}_3\text{CH}_3$   
A strong acid has a weak conjugate base, hence the decreasing order of basic strength is  $\text{CH}_3\text{CH}_2^- > \text{NH}_2^- > \text{HC} \equiv \text{C}^- > \text{OH}^-$
- 5 (b)  
On removal of  $\text{CO}_2$  (one of the reaction), reaction will proceed in backward direction.
- 6 (c)  
Common ion effect includes two necessary points; one presence of common ion and the other a weak electrolyte.
- 7 (b)



Gaseous mole before - 1 0

dissociation

Gaseous mole after -  $(1 - \frac{50}{100})(\frac{2 \times 50}{100})$

dissociation

1. 0.5 1

$\therefore$  Total mole = 1.5 and  $\Delta n = 1$

Total pressure given at equilibrium = 12 atm

$$K_p = \frac{(n_{\text{CO}})^2}{(n_{\text{CO}_2})} \times \left[ \frac{P}{\sum n} \right]^{\Delta n} = \frac{(1)^2}{0.5} \times \left( \frac{12}{1.5} \right)^1$$

$$K_p = \frac{12}{1.5 \times 0.5} = 16 \text{ atm}$$

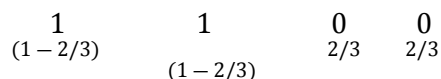
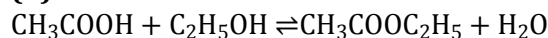
8 **(b)**

If  $K_w = 10^{-12}$ , then  $[H^+]$  for neutral scale =  $10^{-6}$  or pH = 6; thus, pH 6.9 refers for alkaline nature.

9 **(c)**

$$K_c = \frac{[Cl_2][PCl_3]}{[PCl_5]} = \frac{\frac{0.2}{10} \times \frac{0.2}{10}}{\frac{0.1}{10}} = 0.04$$

10 **(d)**



$$\therefore K_c = \frac{\frac{2}{3} \times \frac{2}{3}}{\frac{1}{3} \times \frac{1}{3}} = 4$$

11 **(b)**

$$K_c = \frac{[NO_2]^2}{[N_2O_4]} = \frac{4 \times (0.05)^2}{0.05} = 4 \times 0.05 = 0.2$$

12 **(d)**

$$\text{Millieq. of } 0.01 \text{ M HCl} = \frac{0.01 \times 100}{1000} = 1 \times 10^{-3}$$

$$\therefore \text{pH} = 3$$

$$\text{Millieq. of } 0.02 \text{ M H}_2\text{SO}_4 = \frac{0.04 \times 50}{1000} = 2 \times 10^{-3}$$

$$\text{Millieq. of } 0.02 \text{ M NaOH} = \frac{0.02 \times 50}{1000} = 1 \times 10^{-3}$$

$$\text{Left } [H^+] = 2 \times 10^{-3} - 1 \times 10^{-3}; \therefore \text{pH} = 3$$

13 **(a)**

$$K_p = \frac{p_{CO}^2 p_{O_2}}{p_{CO_2}^2} = \frac{[0.4]^2 \times [0.2]}{(0.6)^2} = 0.0888$$

14 **(d)**

$$\text{pH} = 4.5 + \log \frac{[\text{Conjugate base}]}{[\text{Acid}]}$$

$$\therefore [\text{Salt}] = [\text{Acid}], \text{ since } [A^-] = [H_A]$$

$$\therefore \text{pH} = 4.5 \therefore \text{pOH} = 9.5$$

15 **(b)**

We know that,

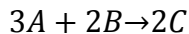
$$\text{pH} = \text{p}K_a + \log \frac{[\text{salt}]}{[\text{acid}]}$$

$$\text{or } \text{pH} = -\log 10^{-8} + \log \frac{1}{1}$$

$$(\because [\text{salt}] = [\text{acid}])$$

$$\text{or } \text{pH} = 8$$

16 **(c)**

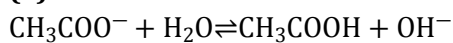


$$K_c = \frac{\text{concentration of products}}{\text{concentration of reactants}} \\ = \frac{[C]^2}{[A]^3 \times [B]^2}$$

18 **(a)**

Only in reaction (ii)  $\text{H}_2\text{PO}_4^-$ , gives  $\text{H}^+$  to  $\text{H}_2\text{O}$ , thus behaves as an acid.

19 **(a)**



$$\therefore [\text{OH}^-] = c \cdot h = c \sqrt{\frac{K_H}{c}} = \sqrt{K_H \cdot c} = \sqrt{\frac{K_w}{K_a} \cdot c}$$

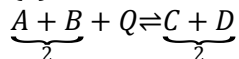
$$\text{or } -\log \text{OH} = -\frac{1}{2} [\log K_w + \log c - \log K_a]$$

$$\text{or } \text{pOH} = \frac{1}{2} [\text{p}K_w - \log c - \text{p}K_a]$$

$$\text{Now, pH} + \text{pOH} = \text{p}K_w$$

$$\therefore \text{pH} = \frac{1}{2} [\text{p}K_w + \log c + \text{p}K_a].$$

20 **(a)**



The reaction is endothermic so, on increase temperature concentration of product will increase

PE

| <b>ANSWER-KEY</b> |           |           |           |           |           |           |           |           |           |           |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Q.</b>         | <b>1</b>  | <b>2</b>  | <b>3</b>  | <b>4</b>  | <b>5</b>  | <b>6</b>  | <b>7</b>  | <b>8</b>  | <b>9</b>  | <b>10</b> |
| <b>A.</b>         | <b>C</b>  | <b>B</b>  | <b>A</b>  | <b>B</b>  | <b>B</b>  | <b>C</b>  | <b>B</b>  | <b>B</b>  | <b>C</b>  | <b>D</b>  |
|                   |           |           |           |           |           |           |           |           |           |           |
| <b>Q.</b>         | <b>11</b> | <b>12</b> | <b>13</b> | <b>14</b> | <b>15</b> | <b>16</b> | <b>17</b> | <b>18</b> | <b>19</b> | <b>20</b> |
| <b>A.</b>         | <b>B</b>  | <b>D</b>  | <b>A</b>  | <b>D</b>  | <b>B</b>  | <b>C</b>  | <b>A</b>  | <b>A</b>  | <b>A</b>  | <b>A</b>  |
|                   |           |           |           |           |           |           |           |           |           |           |

**PE**