21. (a) $BaCl_2 \rightleftharpoons Ba^{2+} + 2Cl^-$

Initially 1 0 0

After dissociation $a - \alpha$ α 2α

Total = $1 - \alpha + \alpha + 2\alpha = 1 + 2\alpha$

$\alpha = \frac{1.98-1}{\alpha} = \frac{0.98}{\alpha} = 0.49$

for a mole $\alpha = 0.49$

For 0.01 mole $\alpha = \frac{0.49}{0.01} = 49$

22. (c) It is an ionic salt.

23. (b) Due to common ion effect of H^+.

24. (d) Current does not affect the degree of ionization.

25. (c) Polar solvent facilitate ionisation of strong electrolytes due to dipole-ion attraction.

26. (d) $HA \rightleftharpoons H^+ + A^-$

$K = Ca^2 = 0.1 \times (10^{-4})^2 = 10^{-9}$

27. **(d)** $\sqrt{K_a \cdot c}$

For a weak acid, dissociation is very small.
So we use the approximation:
$HA \rightleftharpoons H^+ + A^-$

Dissociation is small ⇒

Let initial concentration = c

Let x = $[H^+]$ at equilibrium

Then:

$$K_a = \frac{(x \times x)}{(c - x)}$$

Since x is very small, we take c − x ≈ c

So:

$$K_a \approx \frac{x^2}{c}$$

Therefore:

$x = \sqrt{K_a \times c}$

And x = $[H^+]$, so:

$[H^+] = \sqrt{K_a \cdot c}$

28. (d) Degree of dissociation α = ?

Normality of solution = 0.1 $N = \frac{1}{10}N$

Volume = 10 *litre*

Dissociation constant $K = 1 \times 10^{-5}$

$K = \frac{\alpha^2}{V}$; $\alpha = \sqrt{KV} = \sqrt{1 \times 10^{-5} \times 10}$; $\alpha = 1 \times 10^{-2}$

29. (d) $MgCl_2 \rightleftharpoons Mg^{++} + 2Cl^-$ in aqueous solution it is dissociated into ions.

30. (c) Ostwald's dilution formula is $\alpha^2 = K(1-\alpha)/C$ but for weak electrolyte α is very small. So that $(1-\alpha)$ is neglected for weak electrolytes. So for weak electrolyte the dilution formula is $\alpha = \sqrt{\frac{K}{C}}$.

31. (b) $K_a = C\alpha^2 = 0.2 \times \left(\frac{32}{100}\right)^2 = 2.048 \times 10^{-4}$.. (c) $H_2SO_4 \rightleftharpoons H^+ + H^-SO_4 \rightleftharpoons H^+ + SO_4^{--}$

Because of it is completely ionised.

33. (c) Colour of electrolyte depends on the nature of both ions.

e.g. $CuSO_4$ is blue because Cu^{2+} ions are blue.

34. (c) Ionisation depends upon dilution, when dilution increases then ionisation is also increased.

35. (a) More is K_a, lesser is $pK_a (pK_a = -\log K_a)$ more is acidic strength.

36. For weak acid dissociation:

$HCN \rightleftharpoons H^+ + CN^-$

Let dissociation = x

So,

$[H^+] = x$

$[CN^-] = x$

Remaining HCN ≈ 0.1 M

Using the formula:

Ka = (x × x) / 0.1

⇒ x^2 = Ka × 0.1

⇒ x = $\sqrt{(4 \times 10^{-10} \times 0.1)}$

⇒ x = $\sqrt{(4 \times 10^{-11})}$

⇒ x = $2 \times 10^{-5}.^5$

$10^{-5}.^5 \approx 3.162 \times 10^{-6}$

So,

x = $2 \times 3.162 \times 10^{-6}$

x = 6.324×10^{-6} M

≈ **6.3×10^{-6} M**

Final Answer: **(c) 6.3×10^{-6} M**