

21. $pH + pOH = 14$
 $pOH = 14 - pH$
 $= 14 - 5.84$
 $= 8.16$
 the pH is 8.16

22. $pH = 14 - pOH$
 $= 14 - 2.77$
 $= 11.23$
 pH is 11.23

23. $pH = -\log [H_3O^+]$
 $= -\log (3.20 \times 10^{-10})$
 $= 9.49$
 $pOH = 14 - 9.49$
 $= 4.51$

24. $[NaOH] = \frac{0.45 \text{ mol}}{3.75 \text{ L}}$
 $= 0.12 \frac{\text{mol}}{\text{L}}$

$pOH = -\log [OH^-]$
 $= -\log (0.12)$
 $= 0.92$

$pH = 14 - 0.92$
 $= 13.08$

25. $[OH^-] = \frac{0.42 \text{ mol}}{2.00 \text{ L}}$
 $= 0.21 \frac{\text{mol}}{\text{L}}$

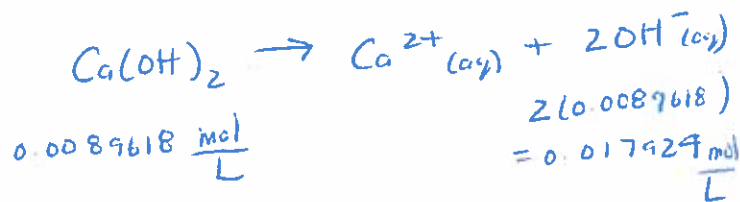
$pOH = -\log (0.21)$
 $= 0.68$
 $pH = 14 - 0.68$
 $= 13.32$

26. $pOH = -\log (1.74 \times 10^{-9})$
 $= 8.759$
 $= 8.76$
 $pH = 14 - 8.76$
 $= 5.24$

27. $[H_3O^+] = 0.097 \frac{\text{mol}}{\text{L}}$
 $pH = -\log (0.097)$
 $= 1.01$

$pOH = 14 - 1.01$
 $= 12.99$

28. $[Ca(OH)_2] = 0.083 \text{ g} \times \frac{1 \text{ mol}}{74.092 \text{ g}} \times \frac{1}{0.125}$
 $= 0.0089618 \frac{\text{mol}}{\text{L}}$



$pOH = -\log [OH^-]$
 $= -\log (0.017924)$
 $= 1.7$

$pH = 14 - 1.7$
 $= 12.3$

29. $pH = 14 - 7.95$
 $= 6.05$

$[H_3O^+] = 10^{-pH}$
 $= 10^{-6.05}$
 $= 8.91 \times 10^{-7} \text{ mol/L}$

$$36. \quad K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1.0 \times 10^{-14}$$

$$-\log K_w = (-\log [\text{H}_3\text{O}^+]) + (-\log [\text{OH}^-])$$

$$-\log (1.0 \times 10^{-14}) = \text{pH} + \text{pOH}$$

$$14 = \text{pH} + \text{pOH}$$