12.30

$$\frac{70\,mg}{1\,cm^3}(100\,cm^3) = 7000\,mg \text{ or } \boxed{7.0\,g\ NH_4Cl}$$

12.31

$$\frac{37.9\,g\ HCl}{100\,g\ Total} = \frac{5.0\,g}{X\,g\ Total} \qquad \boxed{X = 13.2\,g}$$

12.32

Total mass must be 100 g and 19.7 g of it must be NaOH

∴ 19.7 g NaOH and 80.3 g H_2O

12.33

$158.36 = MM$ of $CrCl_3$

$266.35 = MM$ of $CrCl_3 \cdot 6H_2O$

1 L of Solution must contain 20 g Cr^{3+}

1 Mole of $CrCl_3 \cdot 6H_2O$ contains 1 mole of Cr^{3+} which is 52.00 g

$$\frac{20\,g}{52.00} = 0.385 \text{ moles } CrCl_3 \cdot 6H_2O \text{ needed}$$

$$0.385 \text{ mole} = \frac{X\,g}{266.35\,g/m}$$

$$\boxed{X = 102\,g\ CrCl_3 \cdot H_2O}$$

2.34

$$\frac{10.0\,mg\ CO_3^{2-}}{1\ cm^3}(500\ cm^3) = 5000\ mg \text{ or } 5.0\,g\ CO_3^{2-} \text{ Total}$$

$Na_2CO_3 =$ 45.98, 12.01, 48.00 } 60.01; 105.99 g/m

$$\frac{60.01\,g}{105.99\,g} = \frac{5.0\,g}{X\,g}$$

$X = 8.83\,g$

12.35

$$(100\,g)\left(\frac{1\ cm^3}{1.20\,g}\right) = 83.3\ cm^3$$

12.36

$$\frac{19\,g\ HNO_3}{100\,g\ \text{Total}} = \frac{10\,g\ HNO_3}{X\ \text{Total}} \qquad X = 52.6\,g \text{ Total}$$

$$52.6\,g\left(\frac{1\ cm^3}{1.11\ g}\right) = 47\,g$$

12.37

$$CaCl_2 + Na_2CO_3 \longrightarrow CaCO_3 + 2\,NaCl$$

$Na_2CO_3 = 105.99\,g/m$

$$\frac{0.642\,g\ Na_2CO_3}{105.99\,g/m} = 6.057\times10^{-3} \text{ mole } Na_2CO_3$$

$\therefore$ 6.057×10^{-3} mole $CaCl_2$ is needed or $(6.057\times10^{-3})(110.98\,g/m) = 0.672\,g\ CaCl_2$

$$0.672\,g\left(\frac{1000\,mL}{40\,g}\right) = 16.8\ cm^3$$

12.38

Assume we have 1.0 cm^3 of Solution ...

1.0 cm^3 of Solution has a mass of 0.93g, and 18.6% of it is NH_3

$$(0.93g)(0.186) = \boxed{0.173g\ NH_3/cm^3}$$

12.39

1.0 mL of Solution has a mass of 1.12g, and 30.5% of it is HCl

$$1.12g\ (0.305) = \boxed{0.342g\ HCl/cm^3}$$

12.43 A Liter of Milk has 4.0%, by Volume, of Fat and ∴ 40 mL of Fat

That 4 mL of Fat has a mass of 40 mL $\left(\frac{0.865\,g}{1\,mL}\right) = 34.6\,g$

Remove the Fat and Volume of one Liter of milk is reduced to 960 mL

and the mass is reduced to 997.4 g.

The new density of the "Skimmed" Milk is

$$\frac{997.4\,g}{960\,mL} = \boxed{1.039\,g/mL}$$

12.44

49 g Rosin = 46.7%

28 g Shellac = 26.7%

28 g Beeswax = 26.7%

105 g Total

46.7% of 75 Kg = 35 Kg Rosin

26.7 of 75 Kg = 20 Kg Beeswax

20 Kg Shellac

12.45

100 g of Solution at 5% $CaCl_2$ will have 5 g $CaCl_2$

In one mole $CaCl_2 \cdot 6H_2O$ there are 218.98 g

($CaCl_2$ = 110.98 g, $6H_2O$ = 108 g)

$$\frac{110.98\,g}{218.98\,g} = \frac{5.0\,g}{X} \qquad \boxed{X = 9.9\,g} \; \boxed{CaCl_2 \cdot 6H_2O}$$

4.9 g of this must be H_2O so you only need

$100\,g - 5\,g - 4.9\,g = \boxed{90.1\,g\ H_2O}$

12.62

$2\ eq/mole$

1.5 eq is needed which mean we need 0.75 moles (98 g/m) or 73.5 g H_2SO_4

$$\frac{73.5\,g}{\text{Mass of Solution Needed}} \times 100 = 93.2\%$$

78.86 g of Solution needed Total

$$78.86\,g \left(\frac{1\ cm^3}{1.835\ g}\right) = \boxed{43.0\ cm^3}$$