2. A 2.55 g sample of Magnesium Chloride, MgCl2, is dissolved into a 150ml volume of water.

a. Determine the resulting concentration of the solution. (3)

$M = \frac{(24.31\ g/mol) + 2(35.45\ g/mol)}{95.21\ g/mol}$

$\frac{2.55\ g}{95.21\ g/mol} = 0.0267_8\ mol$

$C = \frac{n}{V} = \frac{0.0267_8\ mol}{0.15\ L} = \boxed{0.18\ M}$

b. If the solution were diluted to a final volume of 650 ml, what would be the concentration of the new solution. (3)

$C_i V_i = C_F V_F$

$C_F = \frac{C_i V_i}{V_F}$

$= \frac{(\cancel{0.0267_8\ mol}\ 0.18\ M)(0.15\ L)}{0.65\ L} = \boxed{0.042\ M}$

3. Nitrogen gas and Hydrogen gas are mixed together to form Ammonia, NH3. If 6.00L of Nitrogen and 14.0L of Hydrogen are mixed together at STP, determine the limiting reactant. (Vm = 22.4L/mol) (6)

$\underline{1}\ N_2 + \underline{3}\ H_2 \rightarrow \underline{2}\ NH_3$

$n_{H_2} = \frac{14.0\ L}{22.4\ L/mol} = 0.625\ mol$

$n_{NH_3} = 0.625\ mol\ H_2 \times \frac{2\ mol\ NH_3}{3\ mol\ H_2} = \boxed{0.417\ mol\ NH_3}$

$n_{N_2} = \frac{6.00\ L}{22.4\ L/mol} = 0.267_9\ mol\ N_2$ | $n_{NH_3} = 0.267_9\ mol \times \frac{2\ mol\ NH_3}{1\ mol\ N_2} = \boxed{0.536\ mol\ NH_3}$

$\therefore LR = H_2$