

a. $(50g \frac{4}{9} H_2SO_4) \times (1 \text{ mol}) = 816 \text{ mol } H_2SO_4$
(57.07g)

$(816 \text{ mol } H_2SO_4) \times (1 \text{ mol } Al_2(SO_4)_3) = 272 \text{ mol } Al_2(SO_4)_3$

$(75g \text{ Al(OH)}_3) \times (1 \text{ mol}) = 961 \text{ mol } Al(OH)_3$
(78.01g)

$(961 \text{ mol } Al(OH)_3) \times (1 \text{ mol } Al_2(SO_4)_3) = 481 \text{ mol } Al_2(SO_4)_3$

2 mol Al(OH)₃
 $\therefore H_2SO_4$ is limiting

b. $(816 \text{ mol } H_2SO_4) \times (2 \text{ mol } Al(OH)_3) = 544 \text{ mol } Al(OH)_3$
3 mol H₂SO₄
USED

961 mol Al(OH)₃ given - 544 mol used = 417 mol Al(OH)₃ IN EXCESS

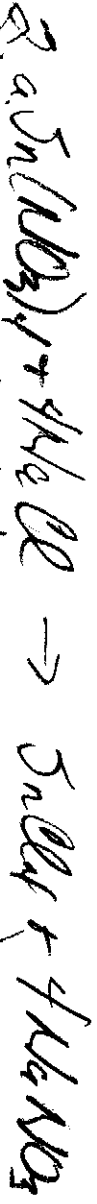
$(417 \text{ mol } Al(OH)_3) \times (77.01g) = 32535 \text{ Al(OH)}_3$ IN EXCESS

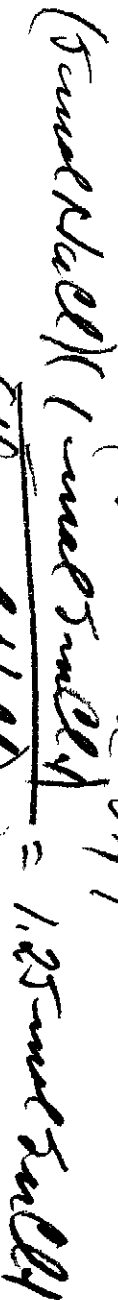
c. $(816 \text{ mol } H_2SO_4) \times (1 \text{ mol } Al_2(SO_4)_3) = 816 \text{ mol } Al_2(SO_4)_3$

$(3 \text{ mol } H_2SO_4) \times (342.14g) = 9606g \text{ Al}_2(SO_4)_3$
3 mol H₂SO₄

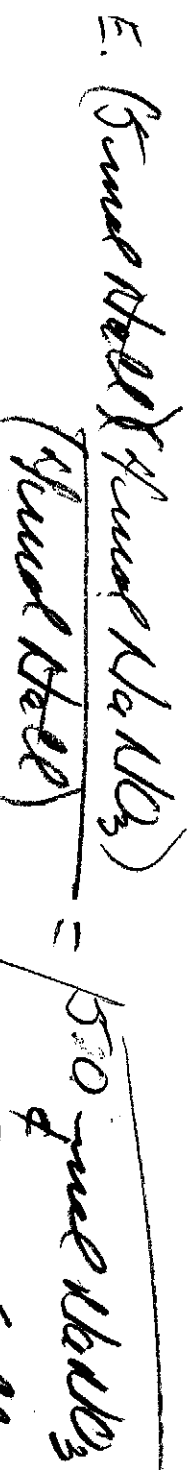
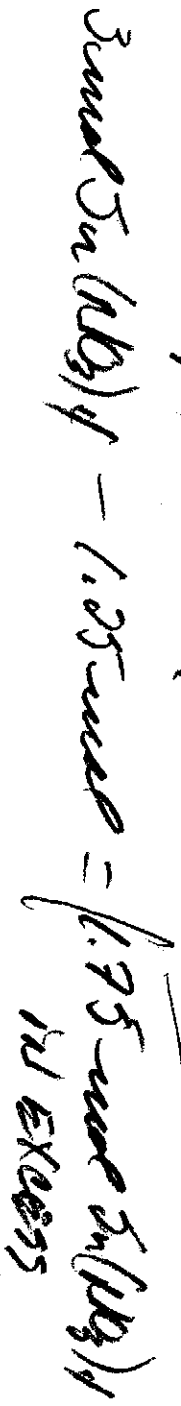
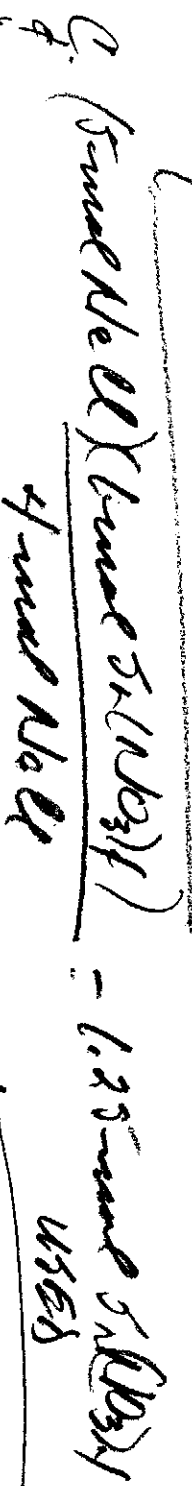
$(816 \text{ mol } H_2SO_4) \times (6 \text{ mol } H_2O) = 1632 \text{ mol } H_2O$
3 mol H₂SO₄

$(1.632 \text{ mol } H_2O) \times (18.02g) = 29.415g \text{ H}_2O$
used

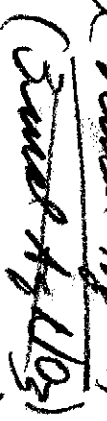
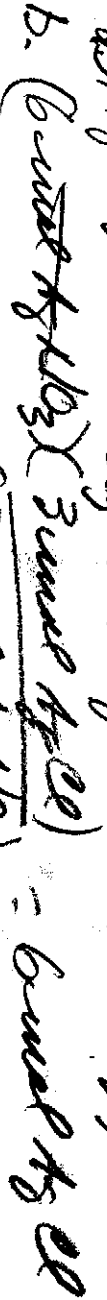




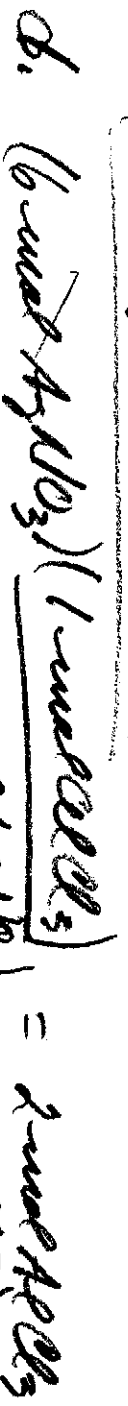
$\therefore H_2O$ is limiting

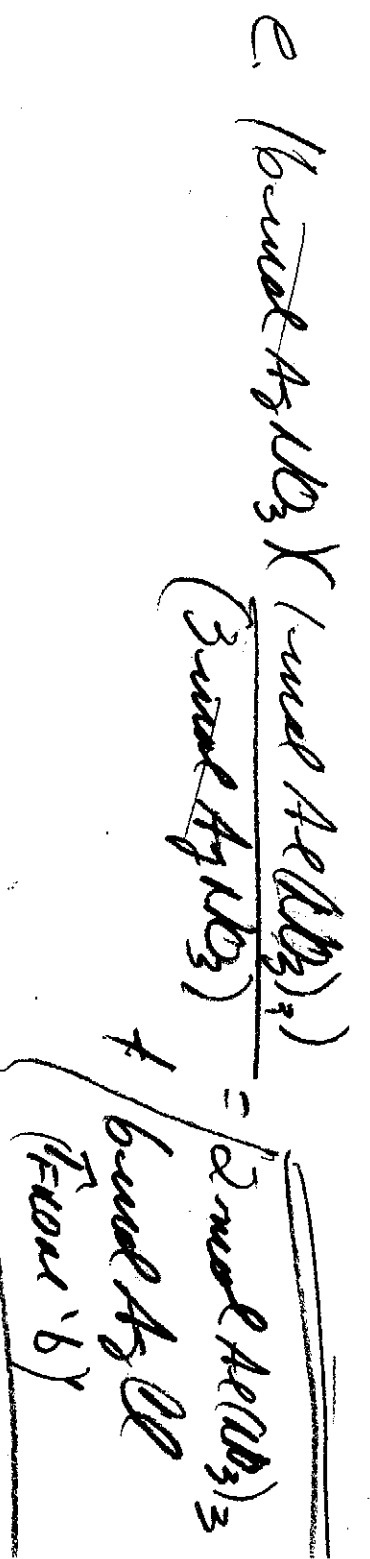


FROM "b"

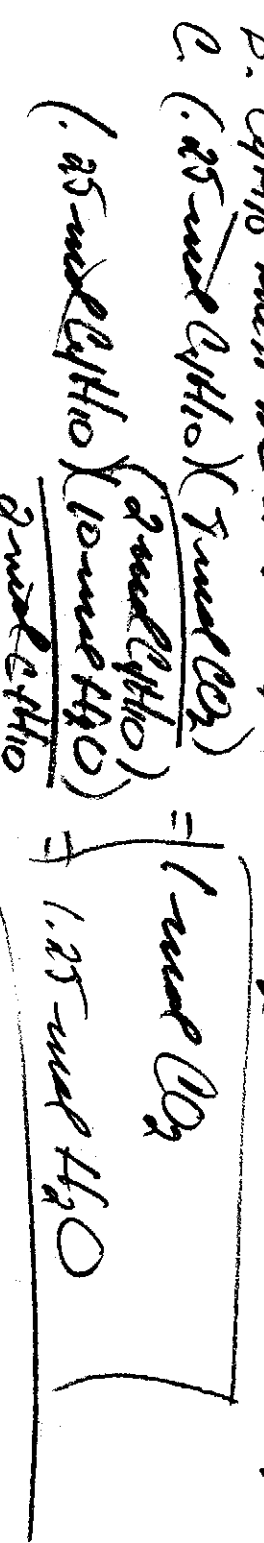


$\therefore AgNO_3$ is limiting

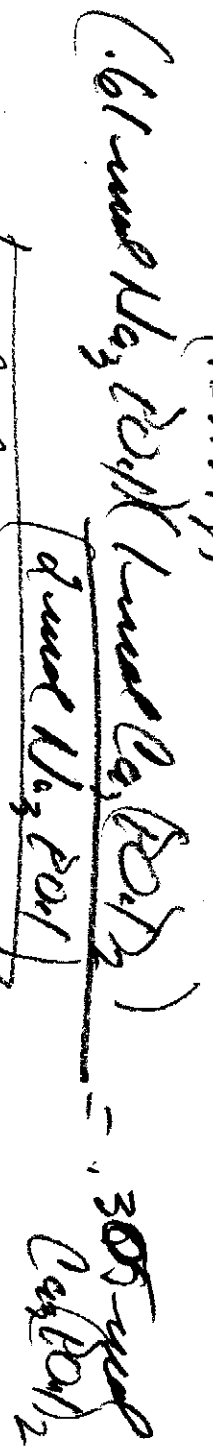
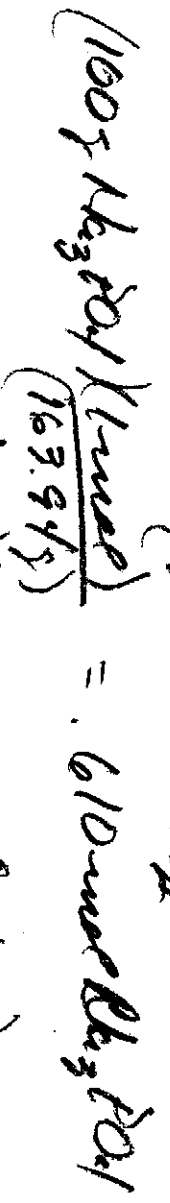
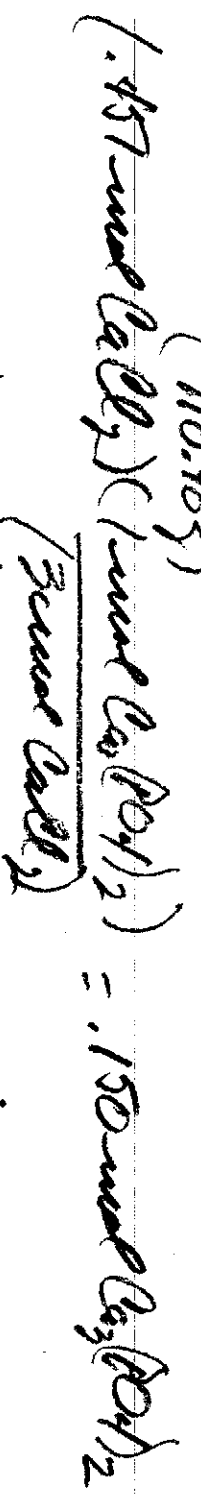
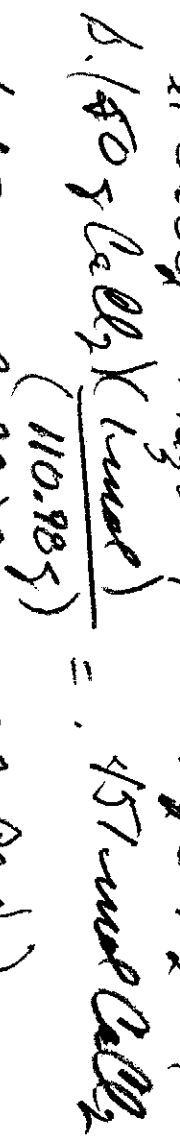




b. C_2H_6 must be limiting as the O_2 comes from air.

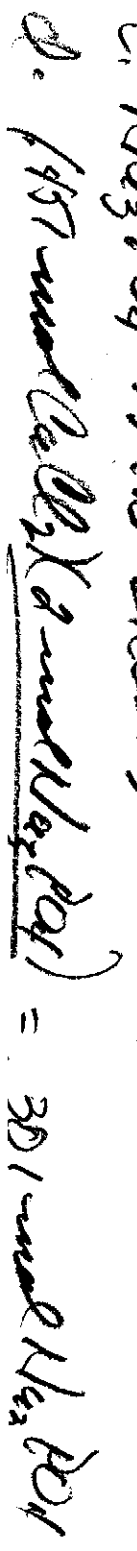


$2 \text{C}_2\text{H}_6 + 13 \text{O}_2 \rightarrow 8 \text{CO}_2 + 10 \text{H}_2\text{O}$



$\therefore \text{CaO}$ is limiting

c. Na_3PO_4 is in excess



5. $CaCl_2$ with $K_2PO_4 \rightarrow Ca_3(PO_4)_2 + 6HCl$

b. $150 \text{ g } CaCl_2 \times \frac{(1 \text{ mole})}{(110.98 \text{ g})} = .451 \text{ mole } CaCl_2$

$(.451 \text{ mole } CaCl_2) \times (1 \text{ mole } Ca_3(PO_4)_2) = .150 \text{ mole } Ca_3(PO_4)_2$
(Excess $CaCl_2$)

$(160 \text{ g } K_2PO_4) \times \frac{(1 \text{ mole})}{(163.94 \text{ g})} = .610 \text{ mole } K_2PO_4$

$(.61 \text{ mole } K_2PO_4) \times (1 \text{ mole } Ca_3(PO_4)_2) = .305 \text{ mole } Ca_3(PO_4)_2$
(Excess K_2PO_4)

$\therefore CaCl_2$ is limiting

c. K_2PO_4 is in excess

d. $(.451 \text{ mole } CaCl_2) \times (2 \text{ mole } H_3PO_4) = .301 \text{ mole } H_3PO_4$
(3 mole $CaCl_2$) USED

$.610 \text{ mole } H_3PO_4$ (given) - $.301 \text{ mole used}$ = $.309 \text{ mole } H_3PO_4$ in excess

e. $(.451 \text{ mole } CaCl_2) \times (6 \text{ mole } HCl) = .902 \text{ mole } HCl$
(3 mole $CaCl_2$)

$.15 \text{ mole } Ca_3(PO_4)_2$
 \rightarrow produce
How's it?