

CHEM131 HOMEWORK #1 KEY

2-19. Avogadro's hypothesis suggests the following equation  $\text{Cl}_2 + 3\text{F}_2 \mapsto 2\text{X}$ . Clearly, the product X contains 1 Cl atom and 3 F atoms;  $\text{Cl}_2 + 3\text{F}_2 \mapsto 2\text{ClF}_3$ .

2-33.	#p	#n	#e
a.	12	12	12
b.	12	12	10
c.	27	32	25
d.	27	32	24
e.	27	32	27
f.	34	45	34
g.	34	45	36
h.	28	35	28
i.	28	31	26

2-53. We are given how much hydrogen reacts with 1 g of nitrogen so the simple proportions can be seen by dividing each of the three hydrogen masses by the smallest, 0.024 g:  $0.024/0.024 = 1.0$ ,  $0.144/0.024 = 6$ ,  $0.216/0.024 = 9.0$ ; so the amounts of hydrogen that reacts with 1 g of nitrogen for these three compounds are in the ratio of 1:6:9. The correct formulas are hydrogen azide,  $\text{N}_3\text{H}$ ; hydrazine,  $\text{N}_2\text{H}_4$ ; ammonia,  $\text{NH}_3$ . Check that these formulas are consistent with the above ratios.

2-55. Different masses of the two pure isotopes would react with hydrogen, but this does not violate the law of definite proportions. Any specific mixture of  $^{35}\text{Cl}/^{37}\text{Cl}$  will obey the law of definite proportions, the important thing is that the mixture doesn't change.

The Next Home Work assignment is 2: 35, 40, 42; 3: 24, 27, 30