

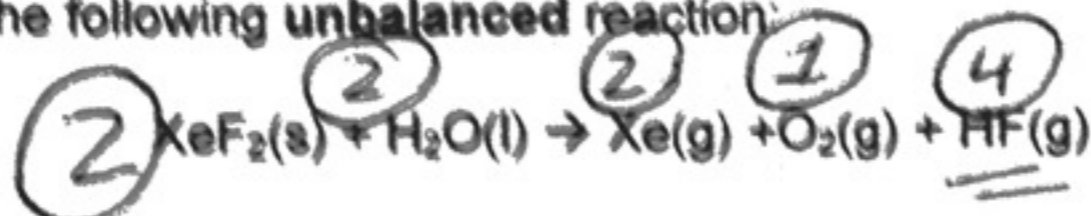
CH301  
 BOOT CAMP  
 FINAL EXAM  
 FREE RESPONSE

Name: KEY

UT EID: \_\_\_\_\_

VERSION #: \_\_\_\_\_

1. (14 pts) Balance the equation and show your work.  $\text{XeF}_2(\text{s})$  reacts with water according to the following unbalanced reaction:



Assuming you have 38.3 g of  $\text{XeF}_2(\text{s})$  and a stoichiometric amount of water present and that the reaction goes to completion; report the number of moles of  $\text{HF}(\text{g})$  and the number of grams of  $\text{HF}(\text{g})$  formed.

$$\frac{38.3 \text{ g XeF}_2}{169.293 \text{ g XeF}_2} \times \frac{1 \text{ mol XeF}_2}{2 \text{ mol XeF}_2} \times \frac{4 \text{ mol HF}}{2 \text{ mol XeF}_2} = \boxed{.452 \text{ mol HF}}$$

$$\frac{.452 \text{ mol HF}}{1 \text{ mol HF}} \times \frac{20 \text{ g HF}}{1 \text{ mol HF}} = \boxed{9.05 \text{ g HF}}$$

2. (14 pts) Assuming the reaction in Question 1 takes place in a container held at a constant pressure of 743 Torr and a constant temperature of  $24^\circ\text{C}$ ; determine the partial pressure of  $\text{HF}(\text{g})$ . Show all your work.

$$P_{\text{total}} = 743 \text{ Torr}$$

$$P_{\text{HF}} = (.571)(743 \text{ Torr}) = 425 \text{ Torr}$$

$$P_i = X_i P_{\text{total}}$$

$$.571 = X_i = \frac{n_i}{n_{\text{total}}} = X_{\text{HF}} = \frac{n_{\text{HF}}}{n_{\text{HF}} + n_{\text{O}_2} + n_{\text{Xe}}} = \frac{.452}{.452 + .113 + .266}$$

$$n_{\text{O}_2} = \frac{.452 \text{ mol HF}}{4 \text{ mol HF}} \times 1 \text{ mol O}_2 = 0.113 \text{ mol O}_2$$

$$n_{\text{Xe}} = \frac{.452 \text{ mol HF}}{4 \text{ mol HF}} \times 2 \text{ mol Xe} = 0.266 \text{ mol Xe}$$

OR BECAUSE YOU KNOW RXN GOES TO COMPLETION  
 RATIO IS 2:1:4 MOLES  $X_{\text{HF}} = \frac{4}{2+1+4} = \frac{4}{7} = .571$