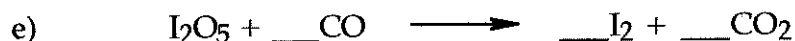
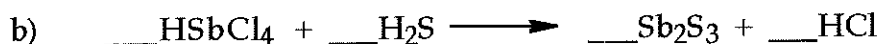
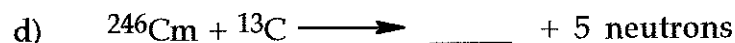
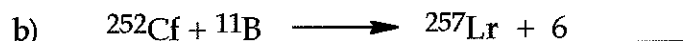
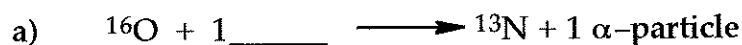


- (20) 1. Balance the following chemical equations by using the lowest set of whole number coefficients:



- (20) 2. Balance the following nuclear equations by supplying the correct missing species:



- (4) 3. Which of the following result(s) in a decrease in nuclear charge?

i. α -decay ii. β -decay iii. positron emission iv. electron capture

a) only iv b) i & ii c) i & iii d) ii & iv e) i, iii, & iv

- (4) 4. A nucleus that has **too high a n/p ratio** can gain stability via:

a) β -decay b) electron capture c) α -decay
d) positron emission e) proton emission

- (4) 5. When a nitrogen atom with 6 neutrons undergoes positron emission, _____ is formed.

a) ^{14}N b) ^{14}C c) ^{13}C d) ^{12}C e) ^{13}N

(4) 6. Which one of the following chemical equations does not represent an oxidation-reduction reaction?

- a) $1 \text{ Fe}_2\text{O}_3 + 3 \text{ CO} \longrightarrow 2 \text{ Fe} + 3 \text{ CO}_2$
- b) $4 \text{ NH}_3 + 5 \text{ O}_2 \longrightarrow 4 \text{ NO} + 6 \text{ H}_2\text{O}$
- c) $2 \text{ PbO} \longrightarrow 2 \text{ Pb} + 1 \text{ O}_2$
- d) $1 \text{ H}_3\text{PO}_4 + 3 \text{ KOH} \longrightarrow 1 \text{ K}_3\text{PO}_4 + 3 \text{ H}_2\text{O}$
- e) All of the above equations are oxidation-reduction reactions

(4) 7. When 12.4 g of phosphorus and 40.0 g of sulfur react, all of the phosphorus is consumed, 44.4 g of P_2S_5 are formed, and some unreacted sulfur remains. The mass of unreacted sulfur is:

- a) 8.0 g
- b) 12.4 g
- c) 27.6 g
- d) 32.0 g
- e) Impossible to determine from the data provided

(4) 8. Consider the following balanced chemical equation:



If 2.0 moles of Ag react with excess H_2S and O_2 to give 0.7 moles of Ag_2S , which one of the following statements is correct?

- a) The percent yield is 100%
- b) The percent yield is 70%
- c) The percent yield is 35%
- d) The theoretical yield is 2.0 moles of Ag_2S
- e) The theoretical yield of the reaction depends upon how large an excess of H_2S and O_2 is used

(4) 9. Consider the following balanced chemical equation:



If 1.0 mole of CaCN_2 and 1.0 mole of H_2O are allowed to react, the maximum number of moles of NH_3 produced will be:

- a) less than 1.0 mole
- b) 1.0 mole
- c) 2.0 moles
- d) 3.0 moles
- e) None of the above choices is correct

- (4) 10. Balance the following chemical equation using the lowest set of whole number coefficients:



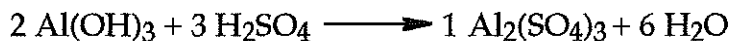
For every mole of NH_3 that reacts, $\underline{\hspace{1cm}}$ moles of O_2 are required.

- a) 0.57 b) 1.25 c) 1.33 d) 1.75 e) 2.67
- (4) 11. Consider the following balanced chemical equation:



If the reaction of 2.0 moles of $\text{NH}_3(\text{g})$ and 2.5 moles of $\text{O}_3(\text{g})$ is run with 100% efficiency:

- a) all of the $\text{NH}_3(\text{g})$ will be consumed
b) all of the $\text{O}_3(\text{g})$ will be consumed
c) 1.0 mole of $\text{N}_2\text{O}_5(\text{g})$ will be produced
d) 60.0 g of $\text{H}_2\text{O}(\text{g})$ will be produced
e) None of the above choices is valid
- (4) 12. Consider the following balanced chemical equation:



How many ml of 6.0M H_2SO_4 are required to react completely with 390.0 g of $\text{Al}(\text{OH})_3$?

- a) 2,340 ml b) 1,923 ml c) 1,750 ml d) 1,457 ml e) 1,250 ml
- (4) 13. Ethane, C_2H_6 , burns in the presence of O_2 to produce CO_2 and H_2O . If 8.00 grams of O_2 are consumed, how many moles of CO_2 will be obtained (assume 100% efficiency)?
- a) 0.143 b) 0.286 c) 0.438 d) 1.00 e) 4.00
- (4) 14. Consider the following balanced chemical equation:



19.95 g of QCl is dissolved in water. If 357 ml of 0.750 M AgNO_3 is required to precipitate all the chloride in solution, what is the identity of element Q?

- a) Li b) Na c) K d) Rb e) Cs

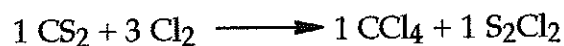
- (6) 15. Calcium carbonate, a major constituent of limestone, undergoes thermal decomposition as shown below:



A 3.00 gram sample of limestone liberates 500.0 ml of CO_2 at 227°C and 2.0 atmospheres. Determine the percent, by mass, of CaCO_3 in the limestone sample.

Assume that any other constituents of limestone are chemically inert. Show all work in the space provided below.

- (6) 16. Consider the following balanced chemical equation:



If 150.0 g of CS_2 and 100.0 g of Cl_2 are allowed to react, what mass (in grams) of excess reagent will remain at the conclusion of the reaction? Show all work in the space provided below.