Quiz 1 Chem 233-03 Your name_____

2/2/10 Student ID#_____

Ten grams of toluene were oxidized with 26.3 grams of chromium trioxide in excess sulfuric acid according to the equation below, producing 3.4 grams of benzoic acid. Atomic weights: H, 1.01; C, 12.01; S, 32.06; Cr, 52.00

toluene benzoic acid

1. Show a balanced reaction equation for this reaction. Use molecular formulas for organic compounds (3 pts).

$C_7H_8 + 2CrO_3 + 3H_2SO_4 \rightarrow C_7H_6O_2 + Cr_2S_3O_{12} + 4H_2O$

92.14 199.98 122.12

2. How many grams theoretical yield do you expect for benzoic acid? Show your calculations! (3 pts).

$\frac{10.0}{92.14} \times 199.98 = 21.70\ g\ CrO_3$ needed → toluene limiting!

$\frac{10.0}{92.14} \times 122.12 = 13.25\ g$ product expected

3. What % yield of theory was obtained? Show your calculations! (3 pts).

$\frac{3.40}{13.25} \times 100 = 25.67\%$ obtained

4. Check all that apply! (6 pts)

Substance	flammable	highly toxic when inhaled
mercury		✓
ethanol	✓	
acetone	✓	