Circle the best answer to each of the following questions ( 30 minutes)

| 1 in. $=2.54 \mathrm{~cm}$ (exactly) | $1 \mathrm{~L}=1000 \mathrm{~cm}^{3}$ | $1 \mathrm{~kg}=2.205 \mathrm{lb}$ |
| :---: | :---: | :---: |
| $1 \mathrm{mile}=5280 \mathrm{ft}=1.609 \mathrm{~km}$ | $1 \mathrm{gal}=4 \mathrm{qt}=8 \mathrm{pt}=3.785 \mathrm{~L}$ | $1 \mathrm{lb}=16 \mathrm{oz}=453.6 \mathrm{~g}$ |
| $1 \mathrm{cal}=4.184 \mathrm{~J}$ | $1 \mathrm{~mole}=6.022 \times 10^{23}{ }^{\text {"things" }}$ | $\mathrm{C}($ water $)=4.18 \mathrm{~J} / \mathrm{g} \cdot{ }^{\circ} \mathrm{C}$ |
| $1 \mathrm{Cal}=1000 \mathrm{cal}$ |  | $\mathrm{C}($ copper $)=0.385 \mathrm{~J} / \mathrm{g} \cdot{ }^{\circ} \mathrm{C}$ |

1) How many electrons does the Ru ion have in compound $\mathrm{Ru}\left(\mathrm{AsO}_{4}\right)_{2}$ ?
A) 44
B) 38
C) 48
D) 50
E) 40
2) Report the answer to this calculation with the correct significant figures: (0.45)(145.4) + (0.70)(128.4)
A) $1.5 \times 10^{2}$
B) $1.6 \times 10^{2}$
C) 155
D) 155.3
E) 155.31
3) How many $\mu \mathrm{g}$ are in $6.0 \times 10^{-5} \mathrm{Mg}$ ?
A) $6.0 \times 10^{-7} \mu \mathrm{~g}$
B) $6.0 \times 10^{5} \mu \mathrm{~g}$
C) $6.0 \times 10^{7} \mathrm{\mu g}$
D) $6.0 \times 10^{-5} \mu \mathrm{~g}$
E) $4.0 \times 10^{9} \mu \mathrm{~g}$
4) A sample of an unknown material has a mass of 38 g and a volume of $6.5 \mathrm{~cm}^{3}$. What is the density of the material in $\mathrm{lb} / \mathrm{in}^{3}$ ?
A) $5.8 \mathrm{lb} / \mathrm{in}^{3}$
B) $0.033 \mathrm{lb} / \mathrm{in}^{3}$
C) $4.7 \mathrm{lb} / \mathrm{in}^{3}$
D) $0.21 \mathrm{lb} / \mathrm{in}^{3}$
E) $0.083 \mathrm{lb} / \mathrm{in}^{3}$
5) A 20.0 g sample of copper is heated to $203^{\circ} \mathrm{C}$ and dropped into a sample of water at $25.0^{\circ} \mathrm{C}$. If the final temperature of the water is $39.0^{\circ} \mathrm{C}$, what mass of water (to 3 significant figures) was used?
A) 80.0 g
B) 0.0233 g
C) 0.165 g
D) 21.6 g
E) 35.0 g
6) How many atoms are in 15 g of perchloric acid?
A) $5.4 \times 10^{23}$ atoms
B) $9.0 \times 10^{22}$ atoms
C) $9.4 \times 10^{24}$ atoms
D) $1.5 \times 10^{22}$ atoms
E) $3.8 \times 10^{27}$ atoms
7) A sample of ore is $65 \% \mathrm{Ni}$ and the remainder is O . How many moles of O are in 62 g of ore?
A) 1.4 mol
B) 2.5 mol
C) $2.5 \times 10^{2} \mathrm{~mol}$
D) $1.4 \times 10^{2} \mathrm{~mol}$
E) 3.9 mol
8) A 1.45-g sample of phosphorus burns in air and forms 2.57 g of a phosphorus oxide. What is the empirical formula of the oxide.
A) PO
B) $\mathrm{PO}_{4}$
C) $\mathrm{P}_{2} \mathrm{O}_{3}$
E) $\mathrm{P}_{3} \mathrm{O}_{4}$
D) $\mathrm{P}_{2} \mathrm{O}_{7}$
9) A mixture of 3.0 g of hydrogen and 8.0 grams of oxygen is ignited, forming water. After the reaction is complete, how much of the excess reactant (in grams) will remain?
A) $2.0 \mathrm{~g} \mathrm{H}_{2}$
B) $1.0 \mathrm{~g} \mathrm{H}_{2}$
C) $6.0 \mathrm{~g} \mathrm{O}_{2}$
D) $2.0 \mathrm{~g} \mathrm{O}_{2}$
E) $9.0 \mathrm{~g} \mathrm{H}_{2} \mathrm{O}$
10) What is the maximum mass (in grams) of gas that can be created when 5.0 g of hydrochloric acid react with 5.0 g of potassium sulfide?
A) 1.8 g
B) 3.2 g
C) 2.3 g
D) 5.0 g
E) 1.5 g
