Dr. Zellmer
Time: 7 PM Sun.
40 min

Chemistry 1250
Spring Semester 2022
Quiz I

Name $\qquad$ Rec. TA/time

Show ALL your work or EXPLAIN to receive full credit.

1. (3 pts) Which of the following statements is INCORRECT?
a) Pure substances must be uniform throughout.
b) Some pure substances can be decomposed into simpler pure substances.
c) Heterogeneous mixtures can contain elements.
d) Every compound is a homogeneous mixture.
e) A heterogeneous mixture must contain at least two different substances.
2. (3 pts) Choose from the following list those properties that are physical properties of the red-brown liquid bromine?
A. Its density is $3.12 \mathrm{~g} / \mathrm{cm}^{3}$.
B. It reacts with hydrogen gas.
C. It freezes to form an orange solid.
D. It boils at $58.8^{\circ} \mathrm{C}$.
E. It forms ionic compounds with metals
a) $\mathrm{B}, \mathrm{E}$
b) A, C, D
c) B, D, E
d) $\mathrm{B}, \mathrm{C}$
e) C
3. ( 3 pts ) Indicate the number of significant figures for each of the following numbers.
a) 0.020510
b) $-9.030 \times 10^{-10}$
4. (4 pts) Do the indicated arithmetic and give the answer to the correct number of significant figures.

$$
(14.9 \times 0.049)-(3.53 \div 0.0840)+101.600
$$

5. (4 pts) Perform the following mathematical operations and report your answer to the correct number of significant figures. Report your answer in scientific notation. Include units..
$\frac{\left(6.115 \times 10^{4} \mathrm{~m}^{2}\right)(36.76 \mathrm{~kg}-29.018 \mathrm{~kg})}{0.0045231 \mathrm{~s}}=$
6. ( 5 pts ) A crucible is known to weigh 24.3162 g . Three students in the class determine the weight of the crucible by repeated measurements on a simple balance. Which of the conclusions summarizes the data?
trial 1 trial 2 trial 3 trial 4 trial 5

| Student A | 24.8 | 24.9 | 24.7 | 24.9 | 24.8 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Student B | 24.6 | 24.0 | 24.2 | 24.1 | 24.3 |
| Student C | 24.5 | 24.1 | 24.5 | 24.1 | 24.3 |

A. student $B$ has done the most precise work and student $C$ the most accurate
B. student B has done the most precise work and student A the most accurate
C. student C has done the most precise work and student B the most accurate
D. student C has done the most precise work and student A the most accurate
E. student A has done the most precise work and student C the most accurate
7. (4 pts) A 27.40-g sample of a metal is placed in a graduated cylinder containing 30.00 mL of water and the water level rises to 31.22 mL . What is the density (in $\mathbf{g} / \mathbf{c m}^{3}$ ) of the sample of metal?
8. (5 pts) Socrates (469-399 B.C.) was made to drink hemlock, which contains the poison coniine. The lethal dose of the drug coniine taken orally is 7.0 mg per kilogram of body weight in mice. Calculate the lethal dose in grams for a 90.0 lb person, assuming that a human functions the way mice do. $(1 \mathrm{lb}=$ 453.6 g )
9. (7 pts) The amount of mercury, Hg , in the air on a particular day is $1.50 \times 10^{-10} \mathrm{lb} / \mathrm{ft}^{3}$. What volume of air (in $\mathbf{m}^{3}$ ) contains $9.13 \times 10^{-9} \mathrm{~kg}$ of mercury? ( $1.000 \mathrm{lb}=453.6 \mathrm{~g}, 1 \mathrm{in}=2.54 \mathrm{~cm}$ ) You MUST use dimensional analysis (factor unit method) to receive full credit!
10. (2 pts) Which of the following statements is TRUE?
a) A hypothesis is speculation that is difficult to test.
b) An observation explains why nature does something.
c) A scientific law is fact.
d) A scientific law summarizes a series of related observations.
e) Once a theory is constructed, it is considered fact.

|  | IA | IIA | IIIB | IVB | VB | VIB | VIIB | VIIIB |  |  | IB | IIB | IIIA | IVA | VA | VIA | VIIA | VIIIA |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | $\begin{array}{\|c} 1.008 \\ \mathbf{H} \end{array}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | $\begin{gathered} 4.003 \\ \mathbf{H e}^{2} \end{gathered}$ |
| 2 | ${ }_{3}^{6.941} \mathbf{L i}^{6}$ | $\begin{aligned} & 9.012 \\ & \mathbf{B e}^{9} \end{aligned}$ |  |  |  |  |  |  |  |  |  |  | $\begin{array}{\|l} 10.811 \\ { }_{5} \end{array}$ | $\begin{array}{\|l\|} \hline 12.011 \\ 6 \end{array}$ |  | $\begin{array}{\|l\|} \hline 15.999 \\ \mathbf{O} \end{array}$ | $\begin{array}{\|l\|} \hline 18.998 \\ \mathbf{F} \end{array}$ | $\begin{array}{\|l} \hline 20.179 \\ \mathbf{N e} \\ 10 \end{array}$ |
| 3 | $\left.\right\|_{11} ^{22.990} \mathbf{N a}$ | $\begin{aligned} & \begin{array}{l} 24.305 \\ \mathbf{M g} \\ 12 \end{array}{ }^{2} . \end{aligned}$ |  |  |  |  |  |  |  |  |  |  | ${\underset{13}{26.98}}^{\text {Al }}$ | ${ }_{14}^{28.09}$ | ${ }_{15}{ }^{30.974} \mathbf{P}$ | ${ }_{16}^{32.06}$ | $\begin{array}{\|c\|} \hline 35.453 \\ \underset{17}{\mathbf{C l}} \end{array}$ | $\begin{array}{\|l\|} \hline 39.948 \\ \mathbf{A r} \\ 18 \end{array}$ |
| 4 | $\begin{array}{\|l} \hline 39.098 \\ { }_{19} \mathbf{K} \end{array}$ | $\begin{aligned} & \hline 40.08 \\ & { }_{20} \mathbf{C a} \end{aligned}$ | $\left.\right\|_{21} ^{44.96} \mathrm{Sc}$ | ${ }_{22} \mathbf{T i}^{47.88}$ | ${\underset{23}{50.94}}^{\mathbf{V}}$ | ${ }_{24}^{\mathbf{C r}}$ | 54.94 <br> $\mathbf{M n}$ | ${ }_{26}^{55.85} \mathbf{F e}$ | 58.93 $\mathbf{C o}$ | ${\underset{28}{\mathbf{N i}}{ }^{58.69}}^{2}$ | $\begin{array}{\|l\|} \hline 63.546 \\ \mathrm{Cu} \\ 29 \end{array}$ | $\begin{array}{\|l\|} \hline 65.38 \\ \mathbf{Z n} \\ 30 \end{array}$ | $\begin{aligned} & \mathbf{6 9 . 7 2}_{\mathbf{G a}}^{31} \end{aligned}$ | $\begin{array}{\|c\|} \hline 72.59 \\ \mathbf{G e} \end{array}$ | $\begin{array}{\|c\|} \hline 74.92 \\ \mathbf{A s} \\ 33 \end{array}$ | $\begin{array}{\|l\|} \hline{ }_{34}^{78.96} \\ \hline \mathbf{S e} \end{array}$ | $\begin{array}{\|c\|} \hline 79.904 \\ \mathbf{B r} \\ 35 \end{array}$ | $\begin{aligned} & 83.80 \\ & \mathbf{K r} \end{aligned}$ |
| 5 | $\begin{aligned} & 85.47 \\ & \mathbf{R b} \\ & 37 \end{aligned}$ | $\stackrel{8}{S r}_{38}^{87.62}$ | ${ }_{39}^{88.91} \mathbf{Y}$ | ${ }_{40}{ }^{91.22} \mathbf{Z r}$ | ${\underset{41}{92.91}}_{\mathbf{N b}}$ | 95.94 <br> Mo <br> 42 | ${ }_{43}$98 <br> $\mathbf{T c}$ | $\begin{array}{\|c\|} \hline 101.07 \\ \mathbf{R u} \\ 44 \end{array}$ | $\begin{array}{\|l\|} \hline 102.91 \\ \mathbf{R h} \\ 45 \end{array}$ | $\begin{array}{\|l\|} \hline 106.42 \\ \text { Pd } \\ 46 \end{array}$ | $\begin{array}{\|c\|} \hline 107.87 \\ \mathbf{A g} \\ \hline 7 \end{array}$ | $\begin{array}{\|c\|} \hline 112.41 \\ \mathbf{C d} \end{array}$ | $\begin{aligned} & \hline 114.82 \\ & \mathbf{I n}^{\mathbf{I n}} \end{aligned}$ | $\begin{array}{\|c\|} \hline 118.69 \\ \text { Sn } \\ 50 \end{array}$ | $\begin{array}{\|c\|} \hline 121.75 \\ \mathbf{S b} \\ \hline 1 \end{array}$ | $\begin{array}{\|l\|} \hline 127.60 \\ \mathbf{T e} \end{array}$ | $\begin{array}{\|c\|} \hline 126.90 \\ \text { I } \\ 53 \end{array}$ | $\begin{array}{\|c} \hline 131.39 \\ \mathbf{X e} \end{array}$ |
| 6 | $\begin{array}{\|c} 132.91 \\ \text { Cs } \\ 55 \end{array}$ | $\begin{array}{\|l} \hline 137.33 \\ \mathbf{B a} \\ 56 \end{array}$ | $\begin{array}{\|l} \hline 138.91 \\ \mathbf{L a}^{\mathbf{L a}} \end{array}$ | $\begin{aligned} & 178.39 \\ & \mathbf{H f} \\ & 72 \end{aligned}$ | $\begin{array}{\|l\|} \hline 180.95 \\ 73 \end{array}$ | $\begin{aligned} & 183.85 \\ & 74 \end{aligned}$ | $\begin{array}{\|l\|} \hline 186.21 \\ \operatorname{Re} \end{array}$ | $\begin{array}{\|l\|} \hline 190.23 \\ \mathbf{O s} \end{array}$ | $\begin{array}{\|l\|} \hline 192.22 \\ \mathbf{I r} \\ 77 \end{array}$ | $\begin{array}{\|c\|} \hline 195.08 \\ \mathbf{P t} \\ 78 \end{array}$ | $\begin{array}{\|c\|} \hline 196.97 \\ \mathbf{A u} \\ 79 \end{array}$ | $\begin{array}{\|c\|} \hline 200.59 \\ \mathbf{H g} \\ 80 \end{array}$ | $\begin{array}{\|l} \hline 204.38 \\ \text { Tl } \\ 81 \end{array}$ | $\begin{array}{\|c\|} \hline 207.2 \\ \mathbf{P b} \end{array}$ | $\begin{array}{\|l\|} \hline 208.98 \\ \mathbf{B i} \end{array}$ | $\begin{gathered} \begin{array}{c} 209 \\ \text { Po } \\ 84 \end{array} \end{gathered}$ | $\begin{array}{r} 210 \\ \mathbf{A t} \\ 85 \end{array}$ | $\begin{array}{\|c} \hline 222 \\ \mathbf{R n} \\ 86 \end{array}$ |
| 7 | ${ }_{87}^{223}$ | $\begin{aligned} & 226.03 \\ & \mathbf{R a}_{88} \end{aligned}$ | $\begin{array}{\|l} \hline 227.03 \\ { }_{89} \mathbf{A c} \end{array}$ | $\begin{array}{\|c} \hline 261 \\ \mathbf{R f} \\ 104 \end{array}$ | $\begin{gathered} 262 \\ \text { Ha } \\ 105 \end{gathered}$ | $\begin{array}{\|c} \hline 263 \\ \mathbf{S g} \\ \hline 06 \end{array}$ | $\begin{gathered} 262 \\ \mathbf{N s} \\ 107 \end{gathered}$ | $\begin{gathered} 265 \\ \mathbf{H s} \\ 108 \end{gathered}$ | $\begin{gathered} 266 \\ \mathbf{M t} \\ 109 \end{gathered}$ | $\begin{gathered} 269 \\ 110 \end{gathered}$ | $\begin{gathered} 272 \\ 111 \end{gathered}$ | $\begin{gathered} 277 \\ 112 \end{gathered}$ |  |  |  |  |  |  |


| Lanthanide Series | ${ }_{58}^{140.12}{ }^{\text {Ce }}$ | $\begin{aligned} & 140.91 \\ & \mathbf{P r} \\ & 59 \end{aligned}$ | $\begin{aligned} & 144.24 \\ & \text { Nd } \\ & 60 \end{aligned}$ | $\left.\right\|_{61}$145 <br> $\mathbf{P m}$ | $\begin{aligned} & 150.36 \\ & { }_{62} \mathrm{Sm} \end{aligned}$ | $\begin{array}{\|c\|} \hline 151.96 \\ \mathbf{E u} \\ \hline 63 \end{array}$ | $\begin{aligned} & 157.25 \\ & \text { Gd } \\ & 64 \end{aligned}$ | $\begin{array}{\|c\|} \hline 158.93 \\ \mathbf{T b} \\ 65 \end{array}$ | ${\underset{\text { Dy }}{ }{ }^{162.50}}^{66}$ | $\begin{aligned} & 164.93 \\ & \text { Ho } \\ & 67 \end{aligned}$ | $\underbrace{167.26}_{68}$ | $\begin{array}{\|c\|} \hline 168.93 \\ \mathbf{T m} \\ \hline 9 \end{array}$ | $\begin{aligned} & \hline 173.04 \\ & \mathbf{Y b} \\ & 70 \end{aligned}$ | $\begin{array}{\|l} \hline 173.04 \\ \mathbf{L u} \\ 71 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Actinide Series | $\begin{aligned} & \hline 232.04 \\ & \text { Th } \\ & 90 \end{aligned}$ | $\begin{aligned} & 231.04 \\ & \mathbf{P a} \\ & 91 \end{aligned}$ | $\begin{array}{\|c} \hline 238.03 \\ 92 \end{array}$ | $\begin{array}{\|l\|} \hline 237.05 \\ \mathbf{N p} \\ 93 \end{array}$ | ${ }_{94} \mathbf{P u}$ | ${ }_{95} \mathrm{Am}$ | ${ }_{96} \mathrm{Cm}$ | ${ }_{97}{ }^{\text {Bk }}$ | ${ }_{98} \mathbf{C f}$ | ${ }_{99}{ }^{\text {Es }}$ | $\underset{100}{\mathbf{F m}}$ | $\begin{array}{\|c} \mathbf{M d} \\ 101 \end{array}$ | ${ }_{102}^{\text {No }}$ | ${ }_{103}^{\mathbf{L r}}$ |

A PERIODIC CHART OF THE ELEMENTS
(Based on ${ }^{12} \mathrm{C}$ )

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