

Question 1 4 Points A chemist needs 2.12 g of a liquid compound with a density of 0.784 g/cm<sup>3</sup>. What volume of the compound is required?

$$\frac{2.12 \text{ g}}{0.784 \text{ g}} \times 1 \text{ cm}^3 = 2.70 \text{ cm}^3$$

2.70 cm<sup>3</sup>

Question 2 3 Points How many significant figures are in the following number: 0.00546

3

Question 3 4 Points Carry out the following calculation and report the answer in the correct number of significant figures.

$$16.8(23.51 - 2.3)$$

356

Question 4 8 Points Give the correct formula for the following polyatomic ions:

- |            |                 |            |                              |
|------------|-----------------|------------|------------------------------|
| 1. Cyanide | CN <sup>-</sup> | 3. Nitrite | NO <sub>2</sub> <sup>-</sup> |
| 2. Nitride | N <sup>3-</sup> | 4. Nitrate | NO <sub>3</sub> <sup>-</sup> |

Question 5 6 Points How many protons, neutrons and electrons are there in <sup>81</sup>Br<sup>-</sup> ?

35

Protons

46

Neutrons

36

Electrons

Question 6 3 Points Chlorine has two isotopes, <sup>35</sup>Cl and <sup>37</sup>Cl. What would you estimate the relative abundance of <sup>37</sup>Cl to be? [Circle the best estimate]

- |         |        |
|---------|--------|
| 1. 100% | 3. 25% |
| 2. 50%  | 4. 0%  |

Question 7 4 Points Copper has two naturally occurring isomers:

	Exact Mass (amu)	Abundance
<sup>63</sup> <sub>29</sub> Cu	62.9296	69.17
<sup>65</sup> <sub>29</sub> Cu	64.9278	30.83

What is the average atomic mass of copper? Give answer to 4 decimal places

$$62.9296(0.6917) + 64.9278(0.3083) =$$

63.5456

Question 8 8 Points The following questions pertain to the periodic table given at the front of this exam:

- Element 29 belongs to which group? 1B
- Element 29 is one of the transition metals.
- The symbol for the lightest Halogen is? F
- How many diatomic elements are in period 2. 3 (N<sub>2</sub>, O<sub>2</sub> and F<sub>2</sub>)

Question 9  
8 Points

1. **Name** the compound with the formula  $\text{AlPO}_4$ ? **Aluminum phosphate**
2. **Name** the compound with the formula  $\text{Co}(\text{NO}_2)_2$ ? **Cobalt(II) nitrite**
3. What is the **formula** for **magnesium carbonate**?  **$\text{MgCO}_3$**
4. What is the **formula** for **iron(II) hydroxide**?  **$\text{Fe}(\text{OH})_2$**

Question 10  
6 Points

- a. How many **moles** of **lead(II) chloride**,  $\text{PbCl}_2$ , are present in a sample that contains **4.96** moles of chloride ions?

$$\frac{4.96 \text{ mol Cl}^-}{2 \text{ Cl}^-} \left| \frac{1 \text{ PbCl}_2}{1 \text{ PbCl}_2} \right. = 2.48 \text{ mol PbCl}_2$$

**2.48** moles  $\text{PbCl}_2$

- b. How many **grams** of **lead(II) chloride** are present in **2.36** moles of  $\text{PbCl}_2$ ?

$$\text{PbCl}_2 = 207.2 + 2(35.45) = 271.8 \text{ g/mol}$$

$$\frac{2.36 \text{ mol PbCl}_2}{1 \text{ mol}} \left| \frac{271.8 \text{ g}}{1 \text{ mol}} \right. = 656 \text{ g PbCl}_2$$

**656** grams  $\text{PbCl}_2$

Question 11  
4 Points

How many **grams** on  $\text{Mg}^{2+}$  are present in **2.86** moles of  $\text{Mg}_3(\text{PO}_4)_2$  ?

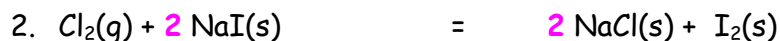
$$\frac{2.86 \text{ mol Mg}_3(\text{PO}_4)_2}{1 \text{ Mg}_3(\text{PO}_4)_2} \left| \frac{3 \text{ Mg}^{2+}}{1 \text{ Mg}_3(\text{PO}_4)_2} \right. = 8.58 \text{ mol Mg}^{2+}$$

$$\frac{8.58 \text{ mol Mg}^{2+}}{1 \text{ mol}} \left| \frac{24.31 \text{ g}}{1 \text{ mol}} \right. = 209 \text{ g Mg}^{2+}$$

**209** grams of  $\text{Mg}^{2+}$

Question 12  
6 Points

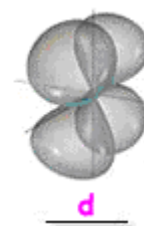
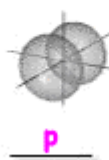
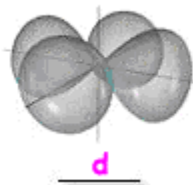
Balance the following chemical equations using the **smallest possible integer coefficients**.



3. **Hydrogen bromide** ( $\text{HBr}$ ) undergoes decomposition to produce **hydrogen** gas and liquid **bromine**.  
 $2 \text{HBr} = \text{H}_2(\text{g}) + \text{Br}_2(\text{l})$

Question 13  
8 Points

Label the following orbital drawings as **s**, **p**, **d** or **f**.



Question 14  
10 Points

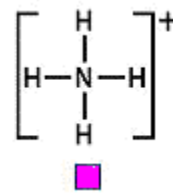
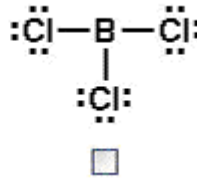
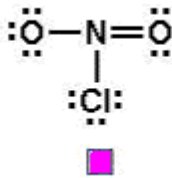
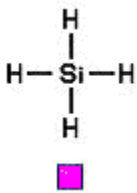
1. Write the **complete** electronic configuration for **nitrogen**?  $1s^2 2s^2 2p^3$
2. Write the **noble gas** configuration for **cobalt**, (Co)?  $[Ar] 4s^2 3d^7$
3. The element with an electron configuration of  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$  **Sc**
4. **Bromine**,  $[Ar] 4s^2 3d^{10} 4p^5$ , has how many **valence electrons**? **7**
5. The element in period **6** that has the Lewis diagram, **X:** **Ba**

Question 15  
6 Points

1. **Br, K, Ca** or **Se**. The one with the largest atomic radius: **K**
2. **I, At, Br** or **Cl**. The one with the smallest ionization energy: **At**
3. **Sr, Ca, Ba** or **Mg**. The most electronegative one: **Mg**

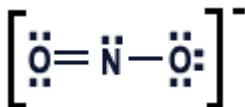
Question 16  
6 Points

From the Lewis structures of the species given, **pick all** of those in which the **central atom obeys the octet rule**.



Question 17  
6 Points

To answer the questions, interpret the following Lewis diagram for  $\text{NO}_2^-$ .



With respect to the **central nitrogen atom**:

1. The number of **lone pairs** = **1**
2. The number of **single bonds** = **1**
3. The number of **double bonds** = **1**

Exam I Score