# Periodic Table and Elements Review

1. Complete **Table 1** to identify an element from the Periodic Table.

**Table 1. Element identification**

| Element name | Chemical symbol | Atomic number | Group number | Period number | Name of group | Uses |
|---|---|---|---|---|---|---|
| | Rb | | | | | in fireworks to produce a purple colour; for electronic transmitting and networking equipment |

   a. Explain what allows this element to produce a colour in fireworks displays.
   b. This element has two naturally occurring isotopes, but only one form, with mass number 87, undergoes radioactive decay. Write the equation showing the beta decay of this radioisotope.
   c. Depict the electron arrangement for this element showing the relevant energy levels and sublevels and the number of electrons at each level and sublevel.

2. Complete **Table 2** to identify an element from the Periodic Table.

**Table 2. Element identification**

| Element name | Chemical symbol | Atomic number | Group number | Period number | Name of group | Uses |
|---|---|---|---|---|---|---|
| | | 74 | | | | in light bulb filaments; for the production of hard materials used for cutters in mining, petroleum, and metalworking |

   a. Identify physical properties that make this element a good choice as a light bulb filament. Explain.
   b. This element has five naturally occurring isotopes, but only one form, with mass number 180, undergoes radioactive decay. Write the equation showing the alpha decay of this radioisotope.
   c. In the production of this element, the ore is first converted to $WO_{3(s)}$, and then heated in the presence of carbon as shown in **Equation 1**:

**Eq.1** $2\ WO_{3(s)} + 3\ C_{(s)} \rightarrow 2\ W_{(s)} + 3\ CO_{2(g)}$

   Explain what this reaction indicates about the relative reactivity of the element and carbon.

3. Two solids are discovered in the chemistry lab and analyzed to determine their properties. Each metal is placed into separate test tubes of sulfuric acid, $H_2SO_{4(aq)}$. The observations were noted in **Table 3**.

**Table 3. Examination of unknown solids**

| Physical properties of solid | Observations on reaction | Product tests |
|---|---|---|
| strip of shiny, greyish solid | bubbles produced on surface of metal; solid appeared to quickly dissolve; clear, colourless solution was produced; solution was hot to the touch | gas produced a "pop" sound when a lit splint was close; remaining aqueous solution was conductive |
| clumps of grey solid (w/ white coating) | vigorous bubbling and spattering around the metal; solid appeared to dissolve almost instantly; clear, colourless solution was produced; solution overflowed due to bubbles and heat | gas produced a "pop" sound when a lit splint was close; remaining aqueous solution was conductive |

   a. Identify two properties of the solids. To what group of the Periodic Table do the solids belong?
   b. Though there are many similarities between the solids, some of the empirical evidence suggests a notable difference. Identify the empirical evidence and what this indicates about the solids.
   c. Explain how the atomic trends that have been studied could be used to account for these differences.