**Problems with Absolute Dating**

**Assumptions**

When we use radiometric dating techniques, we are making a couple of assumptions.

1. We assume that, when the rock sample formed, it contained only

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and no \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The decay occurs in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
In other words, no parent or daughter material is allowed to

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the rock during decay.

These assumptions aren’t always correct, which can lead to some problems when we try to use radiometric dating…

**Problem 1 – Sedimentary Rocks**

Radiometric dating is useful for finding out when magma hardened

into igneous rock, because the magma is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

and contains no daughter material (e.g. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

Sedimentary rocks are made from fragments of older rock, so determining when the rocks were cemented is impossible.

This SUCKS because dating sedimentary rock would really help us

make sense of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

We can only date sedimentary rocks *relative* to close by igneous ones**.**

**Problem 2 – Metamorphic Rocks**

The heat and/or pressure applied during metamorphism increases particle movement, allowing materials to escape.

 - If parent escapes, the rock will seem \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 - If daughter escapes, the rock will seem \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

This makes metamorphic rock hard to date.

HOWEVER, in some situations, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

“resetting” the rock to 100% parent. In this case, radiometric dating

can be used to tell us \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Problem 3 - Radioactive Substances**

Not all radioactive substances that started with 100% parent and decayed in a closed system are useful for dating rocks.

**Example 1: Carbon-14**

 - Carbon-14 is found only in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
 - It has a half-life of 5730 years, so if it DID get into a rock it
 would \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 2: Rubidium-87**

 - Rubidium-87 has a half-life of 48.8 billion years, which is

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Summary:**

So radiometric dating is great for igneous rocks! However, it works…

 - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for metamorphic rocks.

 - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for sedimentary rocks.

The best radioactive substances for dating rocks are

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

and sometimes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.