

# Worksheet: Detecting and Blocking Different Types of Radiation



**Q1:** What is the name of the instrument that can be used to measure the level of radiation in an area?

- A A Sievert counter
- B A Becquerel counter
- C A Rutherford counter
- D A Geiger counter
- E A Thomson counter

**Q2:** Which material is suitable for lining a box that is used to store a radioactive source?

- A Lead
- B Cardboard
- C Polystyrene
- D Gold
- E Iron

**Q3:** Which type of radiation has the shortest range in air?

- A Alpha radiation
- B Gamma radiation
- C Beta radiation

**Q4:** Which type of radiation has the greatest range in air?

- A Alpha radiation
- B Gamma radiation
- C Beta radiation

**Q5:** Which of the following is the approximate range of gamma radiation in air?

- A 1 m
- B 1 km
- C The range is too long to be measured.
- D 10 m
- E 1 cm

**Q6:** What is the approximate range of beta radiation in air?

A 1 m

B 10 m

C 1 km

D 1 cm

E 1 mm

**Q7:** What is the typical range of alpha radiation in air?

A 5 cm

B 50 m

C 0.5 mm

D 1 m

E 0.1 mm

**Q8:** Which of the following types of radiation have no electric charge?

- a. Gamma radiation
- b. Alpha radiation
- c. Beta radiation
- d. Free neutrons

A a and b

B b and c

C a and d

D c and d

E a and c



Question Video

**Q9:** Which of the following types of radiation is negatively charged?

A Free neutrons

B Alpha radiation

C Beta radiation

D Gamma radiation



Question Video

**Q10:** Which of the following types of radiation is positively charged?

A Gamma radiation

B Free neutrons

C Alpha radiation

D Beta radiation

**Q11:** Which of the following types of radiation would be stopped by a 5 mm thick sheet of aluminum?

a. Alpha radiation

b. Free neutrons

c. Gamma radiation

d. Beta radiation

A b and d

B a and d

C c and d

D a and c

E a and b

**Q12:** Which of the following types of radiation would be stopped by a thin sheet of paper?

- A Free neutrons
- B Alpha radiation
- C Gamma radiation
- D Beta radiation

**Q13:** Which type of ionizing radiation is most easily absorbed?

- A Beta radiation
- B Gamma radiation
- C Alpha radiation
- D Free neutrons

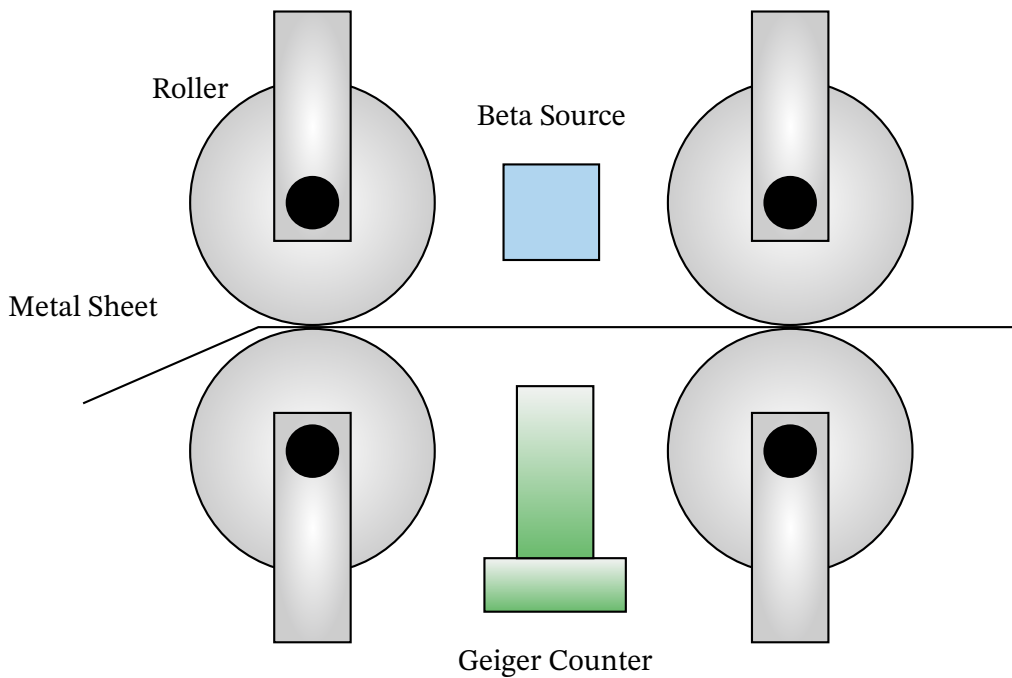
**Q14:** Which of the following is the correct definition of ionization?

- A Ionization is the process of an unstable nucleus emitting a gamma ray.
- B Ionization is the process by which an atom or a molecule becomes electrically charged by losing or gaining electrons.
- C Ionization is the process of an unstable nucleus decaying and emitting a charged particle.
- D Ionization is the process of multiple charged atoms or molecules grouping together.
- E Ionization is the process of charged atoms or molecules becoming electrically neutral.

**Q15:** Which unit is used to measure the number of decays of a radioactive sample per second?

- A Röntgen (R)
- B Becquerel (Bq)
- C Hertz (Hz)
- D Sievert (Sv)
- E Gray (Gy)

**Q16:** Beta radiation can be used to measure the thickness of aluminum foil during production and to automatically control the speed and pressure of the rollers that press the metal into foil. This is shown in the diagram. The Geiger counter measures the amount of radiation that comes through the foil from the beta source on the other side. The Geiger counter is connected to a system that controls the rollers.



► If the foil is \_\_\_\_, then the detector reading \_\_\_\_ and the detector sends a signal to increase the pressure of the rollers on the metal sheet. This makes the foil

—.

- A too thin, increases, thicker
- B too thick, increases, thinner
- C too thin, decreases, thicker
- D too thick, decreases, thicker
- E too thick, decreases, thinner



► If the foil is \_\_\_, then the detector reading \_\_\_ and the detector sends a signal to decrease the pressure of the rollers on the metal sheet. This makes the foil \_\_\_.

A too thick, decreases, thinner

B too thin, decreases, thicker

C too thin, decreases, thinner

D too thin, increases, thinner

E too thin, increases, thicker

► Which of the following correctly explains why alpha radiation would not be suitable for this application?

A Alpha sources do not last very long; therefore, the radioactive source would have to be replaced too often.

B Alpha radiation would be repelled by the foil because both are positively charged; therefore, the Geiger counter would never detect any radiation other than background radiation.

C Alpha radiation passes straight through aluminum foil; therefore, the thickness of the foil would never affect the count rate.

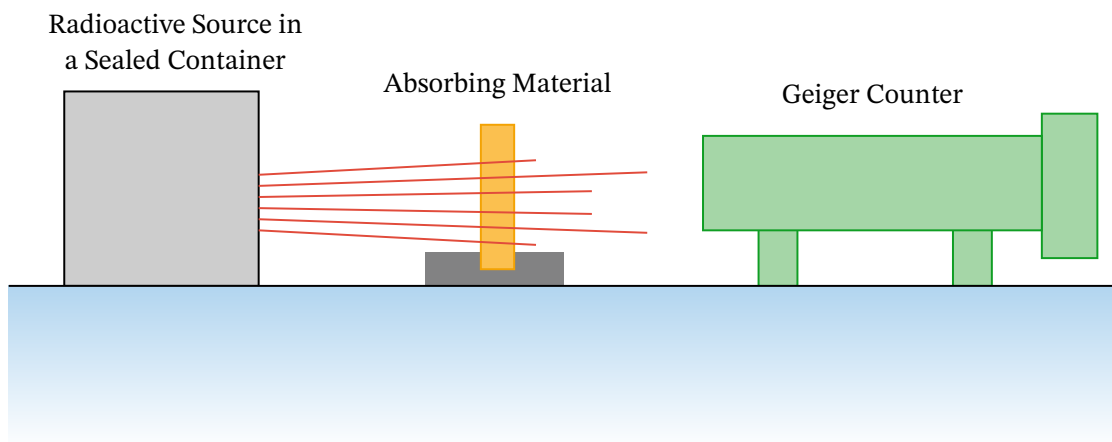
D Geiger counters only detect beta radiation.

E Alpha radiation would be stopped by the foil; therefore, the Geiger counter would never detect any radiation other than background radiation.

**Q17:**

Source	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Absorbing Material	2 mm lead sheet	Thin sheet of paper	8 cm lead sheet	5 mm aluminum sheet

Victoria has four unknown radioactive samples. She wants to find out what type of radiation is emitted by each. She sets up each radioactive source so that it points toward a Geiger counter and then places different materials of different thicknesses in between. The table shows what material and what thickness was needed to block the radiation from each source.



► What type of radiation is emitted by source *A*?

- A Beta radiation
- B Gamma radiation
- C Alpha radiation

► What type of radiation is emitted by source *C*?

A Gamma radiation

B Alpha radiation

C Beta radiation

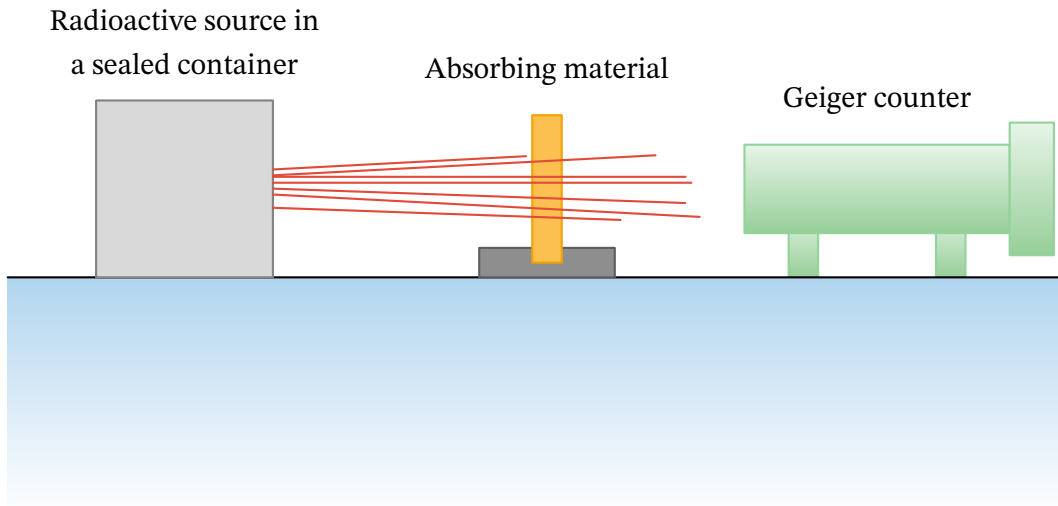
► Which radioactive source is emitting alpha radiation?

A Source *B*

B Source *C*

C Source *D*

D Source *A*

**Q18:**

Source	Counts per Minute			
No Absorbing Material	Thin Sheet of Paper	5 mm Aluminum Sheet	1 cm Lead Sheet	
A	362	334	14	10
B	809	12	10	10
C	251	250	251	248

► What type of radiation is emitted by source A?

- A Gamma radiation
- B Beta radiation
- C Alpha radiation

► What type of radiation is emitted by source B?

- A Gamma radiation
- B Alpha radiation
- C Beta radiation

► What type of radiation is emitted by source C?

A Alpha radiation

B Gamma radiation

C Beta radiation

► Which of the following materials would absorb the radiation emitted by source C?

A Iron that is more than 2 cm thick

B Concrete that is more than 1 m thick

C Tin that is more than 5 cm thick

D Gold that is more than 0.01 mm thick

E Polystyrene that is more than 50 cm thick