

## Half-Life Measurement

**Due 9/1**

In this activity your group will be measuring the half-life of the meta-stable state  $^{137m}\text{Ba}$ .

**Note:** The instrument that your group will be using is delicate and uses high voltage, so be careful using the detector.

### Data Collection

Background rate: Record the number of counts for exactly 5 minutes when there are no radioactive sources nearby.

$N(5\text{min}) =$  \_\_\_\_\_

Divide that number by 15 to get the average number of background counts for 20 seconds, this will be your background rate.

$N_{\text{background}} =$  \_\_\_\_\_

Dr. Hawker will give you a radioactive sample.

1. DO NOT touch the liquid...it is radioactive acid.
2. Hold the detector close to the liquid and start the stopwatch.
3. **Do not move the detector**, you need to keep it the same distance from the sample.
4. Do not stop the stopwatch and do not reset the detector counts while taking data.
5. Every 20 seconds record the total number of counts.
6. Take data for 10 minutes.

### Analysis

Each student should do their own data analysis.

For each 20 second time period calculate the number of decays detected just during that time period minus the expected number of background counts.

Plot the number of decays vs. time, and fit your data to an exponential trendline. This will give the decay constant in base e, but the half-life is in base 2, so to convert use....

half-life =  $\ln(2.0)/(\text{exponent coefficient from fit})$

half-life = \_\_\_\_\_

Cut and paste your data, and your plot with fit and trendline into this file and submit to Turnitin.com.