**TAP 509-3: Radiation in dust**

**Ionisation in the home**
Radon gas is present in the atmosphere of our homes; its daughter products can contribute to the background count as constituents of household dust. In this activity you are asked to collect dust and assess its level of radioactivity.

You will need
- ✔ two sheets of kitchen paper towel
- ✔ radiation sensor, alpha sensitive (NB not a standard GM tube)
- ✔ stop watch
- ✔ rubber band

**What to do**

1. Collect some household dust on a sheet of kitchen paper towel. One way to do this is to cover your finger with the paper and then to wipe your finger over the surface of a dusty television or computer monitor screen. Do this for the whole screen, more than one screen if possible – you need a substantial layer of dust. Put the paper carefully to one side. Do not dislodge the dirt. (Incidentally, one reason for suggesting the dust from a television screen is because it is charged. It therefore attracts the ionised daughter products from, amongst other things, radon decays.)

2. Take a new clean piece of identical kitchen paper. Fix it around the thin window end of the sensor using a rubber band. Take a background measurement for a substantial time, several thousand seconds or even overnight if possible. Automating the capture of the data will prove useful.

3. Without changing any other conditions replace the clean paper with the dusty paper. Wrap it around the GM tube with the dust fingerprint side next to the window so that alpha particles are not absorbed by the paper. Take care not to get the dust onto the sensor.

4. Measure the radioactive count from the dust for the same length of time as before.

5. Look critically at the results. Are they significantly different? Remember that variation in a radiation experiment is equal to the square root of the measurement itself. Do the two results differ by substantially more than this?

**You have**
Measured some of the ambient radiation from a household.
**Practical advice**

This experiment needs care but it does yield interesting results. It requires long timings and not a little luck. Household dust has radioactive products from a number of decays.

In trials a count for 600 s produced the following results: background count (no paper): about 230 counts; background count (with paper): about 240 counts; dust count: about 295 counts. There was a substantial amount of dust on the paper from three computer monitors.

**Alternative approaches**

The use of TASTRAK plastic is a possible substitute here.

The plastic known as CR-39 was developed in 1933 and in 1978 it was found to be an excellent detector of charged particles, which could be revealed by etching the plastic. TASTRAK is a version of CR-39 developed specifically to detect alpha particle tracks. It can be used to demonstrate the detection of radon.

The suppliers, TASL, offer kits of TASTRAK plastic for class use which may then be returned to the Track Analysis Group for processing free of charge. This arrangement is STRICTLY for UK schools, colleges and universities only.

Track Analysis Systems operate a free etching service. It is not recommended that you attempt the etching process yourself. When returning the exposed slides, remember to declare whether you require them to be in microscope or slide projector form.

You can find more information about TASTRAK from http://www.tasl.co.uk/schools.htm or Track Analysis Systems Ltd, H H Wills Physics Laboratory, Tyndall Avenue, Bristol. BS8 1TL, U.K.

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**Be safe**

Students should wash their hands before eating after collecting the dust.

**External references**

This activity is taken from Advancing Physics chapter 18, activity 20H.