# Nuclear Radiation Homework 2 - Dosimetry & Nuclear reactions

**1.** The thyroid gland, located in the neck, is essential for maintaining good health. A radioactive source, which is a gamma radiation emitter, is injected into a patient and is used as a radioactive tracer for the diagnosis of thyroid gland disorders. A gamma camera outside the body follows the path of the tracer as it moves through the body.

a) Why is a gamma source used as a tracer? (1)

b) Another radioactive source is used to **treat** cancer of the thyroid gland. This source emits only beta radiation. Why is this source unsuitable as a **tracer**?(1)

c) The dose that the patient receives is much higher for the beta emitter than for the gamma emitter. Why is this higher dose necessary? (1)

d) The patient receives of 5mJ of beta radiation energy in a gland of mass 80g. Calculate the radiation dose received by the patient (3)

**2.** A hospital technician is works in a nuclear radiation department. As a safety precaution the technician wears a film badge when working with radioactive sources. The film badge contains photographic film. Visible light cannot enter the badge.

Describe how the film badge indicates the **type** and **amount** of radiation received. (3)

**3.** Equivalent dose is a measure of the biological risk of harm from nuclear radiation.

a) State the unit of equivalent dose. (1)

b) For living material the biological effect of radiation depends on a number of factors. State **two** of these factors. (2)