INTRODUCTION
The knowledge about radioactivity and radiation is best imparted while in school, which radioactivity and other concepts of introductory nuclear physics form an important part of schools’ science curriculum [1] and science based undergraduate syllabi. However, many schools do not have the necessary equipments and materials for teaching nuclear physics. There are also a couple of legislations guiding the use and storage of radioactive materials that must be complied with. In addition, many students are apprehensive about handling radioactive substances. These problems can be circumvented, e.g. by creating opportunities for students and their teachers to visit and use facilities available in designated centers like relevant research institutes and university departments [2].

APPARATUS AND MATERIALS REQUIRED FOR THE EXPERIMENTS
Radiation (Gamma-ray) source
The experimental procedures presented here do not employ artificial radiation sources. Instead, the procedure exploits the adsorptive property of activated charcoal (70 g contained in a canister, Figure 1) to adsorb radon from indoor air, and subsequent radioactivity of 222Rn and its decay products; 214Pb and 214Bi.

Gamma-ray spectrometer
A typical NaI detector with MCA is used inside lead shield (to reduce background and allow the detection of low level radioactivity).

EXPERIMENTAL PROCEDURE
Buildup of 222Rn radioactivity in exposed charcoal canister
The charcoal canister was opened and placed on top of the NaI(Tl) detector inside the lead shield (Figure 1 Left). As the charcoal continued to adsorb radon gas, the buildup of radon in the charcoal was monitored by recording the gamma-ray spectra hourly (or every few hours) over the entire exposure period (up to 9 days). The net counts (after subtracting the background counts) in the energy regions from 242 to 609 keV are plotted as a function of time (Figure 2). Number of detected gamma-rays (count) increases rapidly within the first 50 hours of the exposure, indicating that radon production through adsorption exceeded losses through radioactive decay.

Decay of 222Rn radioactivity in exposed charcoal canister
To demonstrate the radioactivity decay law, the canister was sealed and replaced on top of the same detector (Figure 1 Right). Successive measurements of gamma-ray counts were carried out at different times as the decay continued. A plot of the counts versus time shows an exponential decay (Figure 3). This plot can be manipulated to determine the half-life of radon: \( N(t) = N(t = 0) \times \exp(-0.692 t/T_{1/2}) \)

SUMMARY
The experiments presented in this paper could be easily adopted in the curriculum of physics laboratory teaching for schools and undergraduate students. These experiments would help the students to visualize and familiarize themselves with natural sources of environmental radioactivity, in general, and radon in particular. In addition, the students will learn practical radioactivity buildup and decay, which are the basic aspects of introductory nuclear physics. The availability of the radon gas everywhere and the simple way to collect it through the adsorption in activated charcoal presents a safer and simpler alternative radiation source that can be used in teaching and demonstration. This natural radioactive source does not require regulatory control, and the students are not apprehensive of their safety while working with it.

REFERENCES