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Test of isotopic exchanges between O-18 and O-16 when oxygen-18 enriched water contacts with air oxygen

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Nowadays, 2-deoxy-2-D-glucose radiolabeled with Fluorine-18 (^{18}F FDG) is widely used in cancer imaging studies as a popular PET radiopharmaceutical. For synthesis of ^{18}F FDG, ^{18}F radionuclide is first produced by ^{18}O (p, n) ^{18}F nuclear reaction in a Medical Cyclotron. For this nuclear reaction, ^{18}O enriched water (H_2^{18}O) with about 97 % enrichment level is used as a target material in the Medical Cyclotrons. The main purpose of this study was to investigate the probable exchanges between ^{18}O and ^{16}O isotopes when H_2^{18}O contacts considerably long time with air Oxygen. Thus, it would be determined that H_2^{18}O should be avoided to contact with air Oxygen and to keep in an inert gas for long time storages or not. For this experiment, natural Oxygen and Argon gases were separately passed through H_2^{18}O with 1 % ^{18}O enrichment during long times up to about 8 days. Samples of about 1.5 mL taken from H_2^{18}O with 1 % ^{18}O enrichment have been analyzed by Isotopic Ratio Mass Spectrometry (IR-MS) technique in England. ^{18}O analyses have showed that air Oxygen contact causes the decrease of $^{18}\text{O} / ^{16}\text{O}$ ratio and contrarily, Argon contact causes the increase of $^{18}\text{O} / ^{16}\text{O}$ ration. This means that H_2^{18}O should be avoided to contact air Oxygen and during long time storages H_2^{18}O is recommended to keep under an inert atmosphere like Argon. Otherwise, the enrichment level of H_2^{18}O may considerably be decreased.

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