A pH change in aqueous solution after exposure to radiation

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Distilled water and NaI *solutions were exposed to gamma radiation at ambient temperature after controlling their* pH *values. In addition,* $B(OH)_3$ *solutions were exposed to different neutron radiation conditions. After irradiation, the effects of irradiation on the* pH *changes of aqueous solutions were investigated. The* pH *values of aqueous solutions generally decreased after irradiation owing to* NO_2*, a gamma radiolysis product of air. However, the* pH *values of* NaI *solutions below* pH *6 increased after gamma irradiation. In this acidic region, radiolysis products like* OH *radicals and hydrogen peroxides oxidized iodide ions into iodine, and hydroxyl ions were then produced from the oxidation reactions. In addition, in this case, the* pH *change was overwhelmed by the hydroxyl ions produced. On the other hand, the* pH *values of boric acid solutions also decreased after exposure to neutron radiation. In an aqueous medium under neutron irradiation, very high gamma irradiation was induced through the neutron activation of oxygen-16 atoms. Therefore, with the exception of nuclear reactions by neutrons, the behavior of* pH *change under neutron irradiation was observed to be similar to that of gamma irradiation.*

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