sparation of some relevant cyclotron produced redioisotopes

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Since the short-lived cyclotron produced radioisotopes are findingincreasing applications in medicine, industry, research studies and otherfields of life sciences, especially gallium-67, indium-Ill and thallium-201, therefore the main objective of this work is to study the separationand purification of these cyclotron produced radioisotopes as well asrecovery of the encountered highly expensive target materials.This thesis consists of three basic chapters:Chapter(l) Introduction:This chapter includes the routine routes of radionuclide productionby neutron and charged particles activation using both reactor andcyclotron facilities. Structure, cross section and nuclear data importanceare also reported. General chemistry of the products radionuclides andtheir target materials are illustrated. It also implies a concise literaturereview including the nuclear medicine application, production,irradiation, cooling, radiochemical separation and quality assurance testsof the respective product radionuclides.Chapter (2) Experimental:This chapter includes the various chemicals, reagents, radioactivematerials and instnimentation used in this study. The details of theexperiments carried out in this thesis are also reported implying themethod of preparation of the used inorganic ion exchanger resin; 12-molybdocerate (IV). Description of the distribution behaviourinvestigations using static and dynamic studies and the factors affectingthem; including, nature and chemical composition of the exchangemedium and the amount of the radiotracer are illustrated. Thechromatographic column separation studies and the factors affectingthem; including, types, concentration and flow rate of the eluent aredescribed confidentially.Chapter (3) Result and discussionIncludes the obtained results as well as their analysis anddiscussion. Detailed and systematic studies including the distributionbehaviour; breakthrough characteristics and elution profiles for the targetand the product radionuclide couples have been carried out. Thedistribution behaviour of the individual metal ions is determined as ameasure of the corresponding batch distribution coefficient (K.J) values asa function of nature and composition of the equilibrating media (HCI andRN03) as well as the concentration of the radiotracer on the sorbentmaterial dried at 50°C in shaker thermostat adjusted at 25±loC usingbatch equilibrium method. The obtained distribution behaviourrelationships (N values in ml/g vs. concentration of the equilibratingmedium) are discussed on the base of the target and product chemicalspecies which are expected to predominate in the equilibrating solutionand their interactions with the molybdocerate(IV) matrix. Theexperimental conditions

necessary for high target/product separationfactors (a. =I