



were added to the MAMA ligand. The reaction mixture was vigorously stirred and allowed to react in boiling water for 1 h. The solution was filtered through a 0.22  $\mu\text{m}$  filter before HPLC analysis. Radiochemical yield of  $^{188}\text{Re}$ -MAMA was determined by reversed phase HPLC (Hypersil C<sub>18</sub> BDS-5, 4.6 mm $\varnothing$ ×150 mm) using a gradient system comprising 0.1% TFA in H<sub>2</sub>O (solvent A) and 0.1% TFA in acetonitrile (solvent B). The flow rate was 1.0 ml/min and the gradient was defined by the following points (min-%B): 0-5, 30-100. Typical chromatograms are shown in Fig. 2. Retention times of  $^{188}\text{ReO}_4^-$ ,  $^{188}\text{Re}$ -citrate and  $^{188}\text{Re}$ -MAMA are 2.4 min, 2.4 min and 10.2 min, respectively.

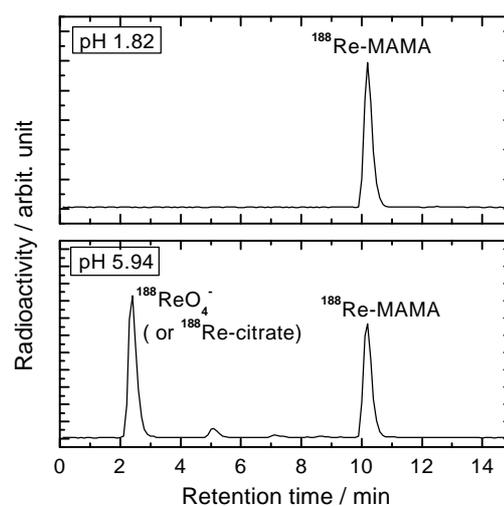


Fig. 2. Chromatograms of carrier-added  $^{188}\text{Re}$ -MAMA synthesized at different pH.

The dependence of the labeling yield upon the reaction conditions such as pH, the concentration of the reducing agent and the addition of a carrier was examined. The influence of the labeling yield on pH is shown in Fig. 3. The maximum labeling yields of both carrier-added and no-carrier-added  $^{188}\text{Re}$ -MAMA were obtained in the acidic pH region less than pH 3 and the labeling yields decreased sharply above pH 3. Under the optimum conditions, the labeling yield of  $^{188}\text{Re}$ -MAMA was more than 98% using no-carrier-added  $^{188}\text{Re}$  as well as carrier-added  $^{188}\text{Re}$  (20  $\mu\text{g}$  Re/ml).

To evaluate the stability of  $^{188}\text{Re}$ -MAMA, the pH of  $^{188}\text{Re}$ -MAMA solution obtained under the optimum conditions was changed by adding HCl, NaOH and/or sodium acetate solution. The radiochemical yield of  $^{188}\text{Re}$ -MAMA was determined by HPLC at appropriate time intervals. The result of the stability of carrier-added  $^{188}\text{Re}$ -MAMA is shown in Fig. 4. Radiochemical yield of carrier-added  $^{188}\text{Re}$ -MAMA after pH change decreased with increasing of pH and the elapse of time when the pH was over 8. However,

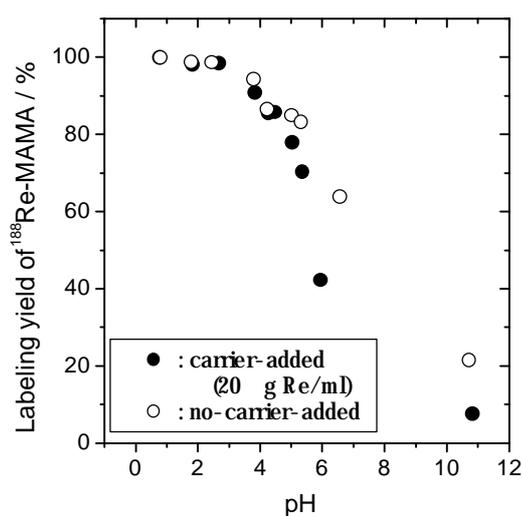


Fig. 3. Influence of pH on the labeling yield of  $^{188}\text{Re}$ -MAMA.

the radiochemical yield of carrier-added  $^{188}\text{Re}$ -MAMA was over 97% in the pH 6 to 7 region even after 70 hours. The same results were obtained for no-carrier-added  $^{188}\text{Re}$ -MAMA.

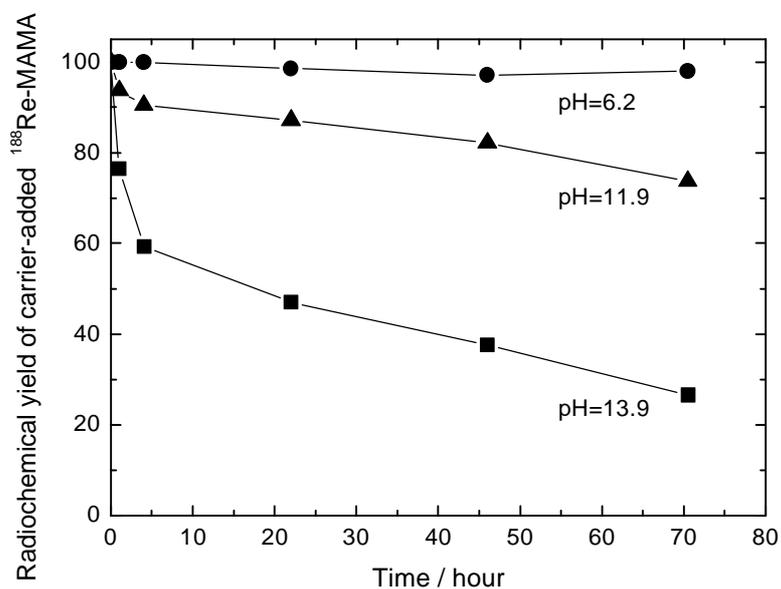


Fig. 4. Stability of carrier-added  $^{188}\text{Re}$ -MAMA in different pH solutions.

## References

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