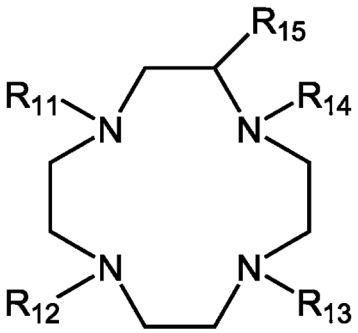
CLAIMS

1. A method for producing a radioactive metal complex, the method comprising a step of allowing a radioactive metal to react with a ligand represented by the following formula (1) in a reaction liquid to form a radioactive metal complex, wherein

the reaction liquid contains water, a buffer, and a water-soluble organic solvent,

the radioactive metal is ^{89}Zr or ^{225}Ac, and

in the case where the radioactive metal is ^{225}Ac, the water-soluble organic solvent in the reaction liquid comprises 10% by volume or more and 50% by volume or less of dimethyl sulfoxide, 2% by volume or more and 15% by volume or less of ethanol, or 2% by volume or more and 15% by volume or less of acetonitrile,



(1)

wherein R_{11}, R_{12}, and R_{13} each independently represent a group of $-(CH_2)_pCOOH$, $-(CH_2)_pC_5H_5N$, $-(CH_2)_pPO_3H_2$, or $-(CH_2)_pCONH_2$; one of R_{14} and R_{15} represents a hydrogen atom or a group of $-(CH_2)_pCOOH$, $-(CH_2)_pC_5H_5N$, $-(CH_2)_pPO_3H_2$, $-(CH_2)_pCONH_2$, or $-(CHCOOH)(CH_2)_pCOOH$, and the other represents a group of $-(CH_2)_pCOOH$, $-(CH_2)_pC_5H_5N$, $-(CH_2)_pPO_3H_2$, or $-(CH_2)_pCONH_2$, or a group linked to a peptide; and p represents an integer of 0 or more and 3 or less.

2. The method for producing a radioactive metal complex according to claim 1, wherein the ligand is a poorly water-soluble ligand.

3. The method for producing a radioactive metal complex according to claim 1 or 2, wherein

in the above formula, R_{11}, R_{12}, and R_{13} each represent a group of $-(CH_2)_pCOOH$; and one of R_{14} and R_{15} represents a hydrogen atom or a group of $-(CH_2)_pCOOH$, and the other represents a group of $-(CH_2)_pCOOH$ or a group linked to a peptide,

when R_{14} represents a group linked to a peptide, R_{15} represents a hydrogen atom, and

when R_{14} does not represent a group linked to a peptide, R_{15} represents a group linked to a peptide.

4. The method for producing a radioactive metal complex according to any one of claims 1 to 3, wherein, in the case where the radioactive metal is ^{89}Zr, the reaction liquid has a content of the water-soluble organic solvent of 2% by volume or more and 50% by volume or less.

5. The method for producing a radioactive metal complex according to any one of claims 1 to 4, wherein, in the case where the radioactive metal is ^{89}Zr, the water-soluble organic solvent is a polar solvent.

6. The method for producing a radioactive metal complex according to any one of claims 1 to 6, wherein, in the case where the radioactive metal is ^{89}Zr, the water-soluble organic solvent is at least one selected from the group consisting of acetonitrile, N,N-

dimethylformamide, dimethyl sulfoxide, and ethanol.

7. The method for producing a radioactive metal complex according to claim 6, wherein, in the case where the radioactive metal is ^{89}Zr, the reaction liquid contains 20% by volume or more and 50% by volume or less of dimethyl sulfoxide as the water-soluble organic solvent.

8. The method for producing a radioactive metal complex according to claim 6 or 7, wherein, in the case where the radioactive metal is ^{89}Zr, the reaction liquid contains 2% by volume or more and 50% by volume or less of ethanol or acetonitrile as the water-soluble organic solvent.

9. The method for producing a radioactive metal complex according to any one of claims 1 to 8, wherein the buffer is one selected from the group consisting of acetic acid and a salt thereof, phosphoric acid and a salt thereof, 2-amino-2-(hydroxymethyl)propane-1,3-diol, 2-[4-(2-hydroxyethyl)-1-piperazinyl]-ethanesulfonic acid, tetramethylammonium acetate, and a basic amino acid.

10. The method for producing a radioactive metal complex according to claim 9, wherein the buffer is contained in a concentration of 0.01 mol/L or more and 5.0 mol/L or less in the reaction liquid.

11. The method for producing a radioactive metal complex according to claim 10, wherein sodium acetate or ammonium acetate as the buffer is contained in a concentration of 0.05 mol/L or more and 2.0 mol/L or less in the reaction liquid.

12. The method for producing a radioactive metal complex according to claim 10, wherein tetramethylammonium acetate as the buffer is contained in a concentration of 0.1 mol/L or more and 2.0 mol/L or less in the reaction liquid.

13. The method for producing a radioactive metal complex according to any one of claims 1 to 12, wherein the radioactive metal is allowed to react with the ligand in the reaction liquid at 30°C or higher and 80°C or lower.

14. The method for producing a radioactive metal complex according to any one of claims 1 to 13, wherein the peptide has a molecular weight of 500 Da or more and 10,000 Da or less.