Molecular Imaging Answer Sheet

5% of total											
Question	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	**Total**
Points	1	2	2	1	1	2	4	4	2	3	22
Score											

1.1 (1.0 pt)
Identify the mother nuclide (**A**) of ^{99m}Tc and and the emitted particle (**B**).
A $\longrightarrow$ $^{99m}\mathrm{Tc}$ + **B**

A=

B=

1.2 (2.0 pt)
Provide the oxidation states of the radiometal in the ^{99m}Tc-probes given in the **question sheet**.

a)

b)

c)

d)

1.3 (2.0 pt)
Calculate the two missing redox potentials **i)** and **ii)**.

i)

ii)

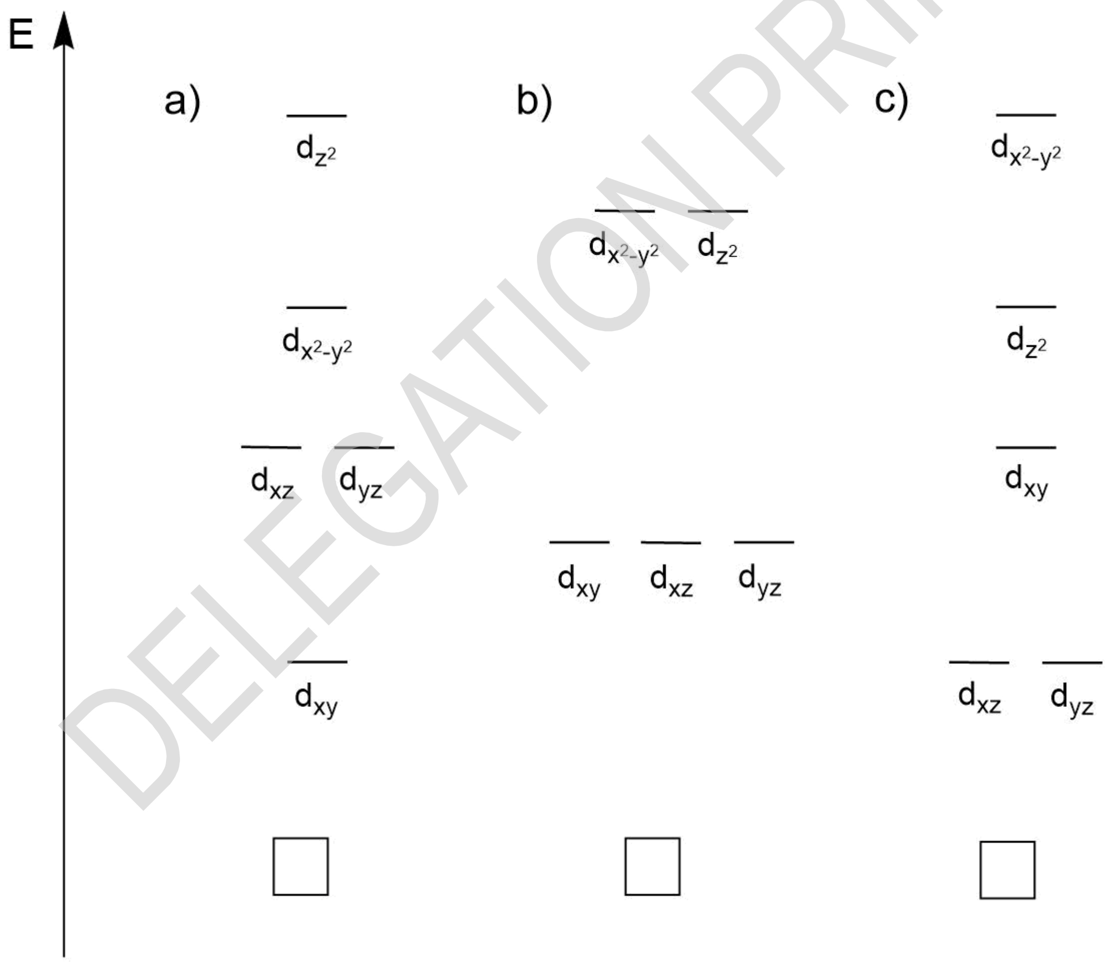
1.4 (1.0 pt)
Compare $[MnO_4]^-$, $[TcO_4]^-$ and $[ReO_4]^-$. **Choose** the strongest oxidizing agent and **tick** your answer.

☐ $[MnO_4]^-$
☐ $[TcO_4]^-$
☐ $[ReO_4]^-$

1.5 (1.0 pt)
Based on the values indicated by **Figure 2** in the question sheet, **select** if TcO_2 would disproportionate to Tc and TcO_4^{2-} under acidic conditions.

☐ yes
☐ no

1.6 (2.0 pt)
Choose which orbital energy diagram explains the observed diamagnetism and **tick** your answer.
Draw the corresponding electron configuration in the correct diagram.



1.7 (4.0 pt)
Write down both oxidation and reduction half-reactions using the formulas of ions or neutral molecules, and the complete redox reaction.

Reduction half-reaction:

Oxidation half-reaction:

Complete redox-reaction:

1.8 (4.0 pt)
Calculate how many mol ^{99m}Tc are present in such samples.

____________________________ mol

1.9 (2.0 pt)
Assume that no activity is lost through excretion. **Calculate** how many hours the patient has to wait until the injected activity decreases to under 1% of the starting activity.

$t =$ ______________________________ h

1.10 (3.0 pt)
Draw the structures of compound **A** and **B.** Further, **state** the oxidation state of the technetium in these compounds.

Oxidation state A:

Oxidation state B: