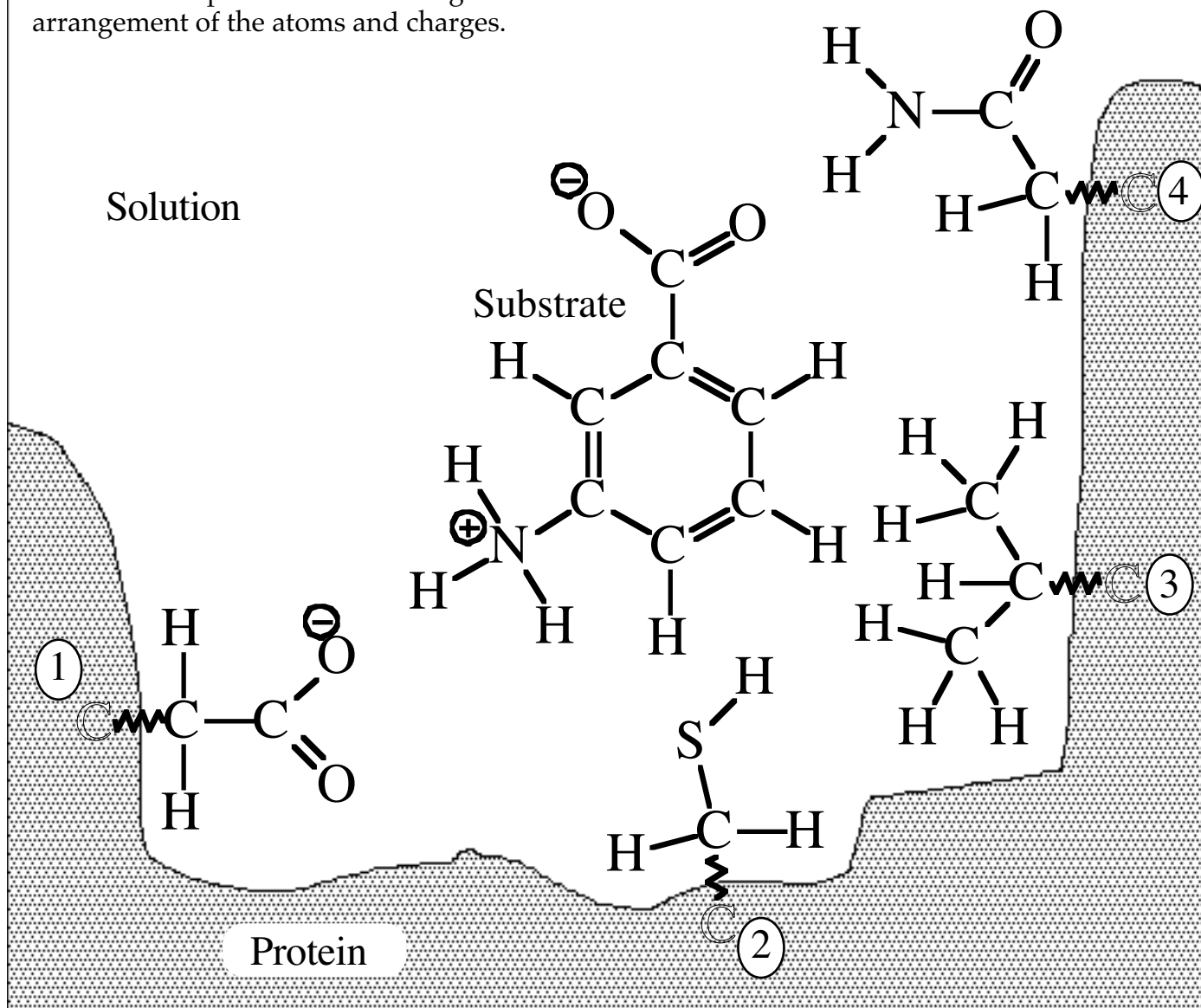


## 7.012 Chemistry Review ANSWERS

This is the simplest correct bonding arrangement of the atoms and charges.

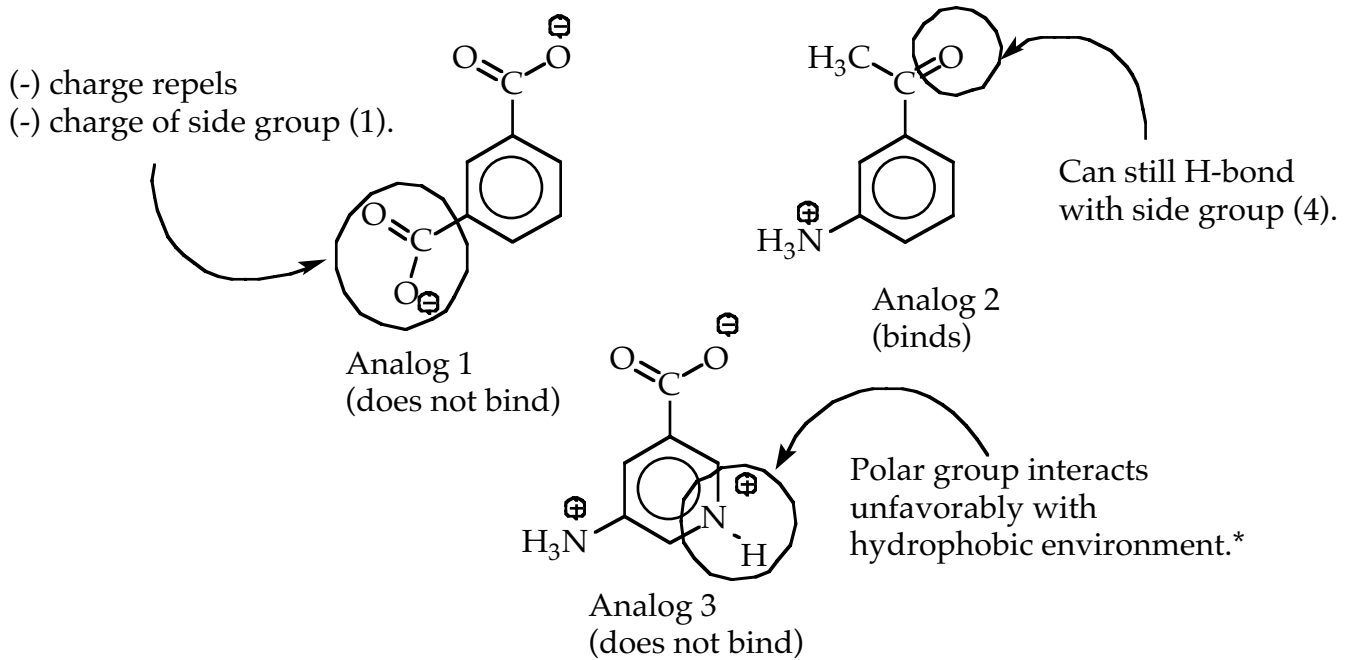


### 2) Non-covalent Interactions

a)

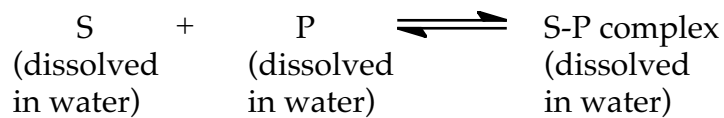
Group	Interaction(s) of Group with Substrate	Classification of Group
(1)	ionic (hydrogen also possible)	hydrophilic-charged
(2)	VDW (neither C nor S is electronegative enough to cause a H-bond to form)	hydrophobic
(3)	VDW (all non-polar bonds)	hydrophobic
(4)	H-bond (VDW also possible)	hydrophilic-polar

3)



\* Note: a more complete way to look at these cases is:

Binding of substrate (S) and protein (P) to form complex (S-P) is an **equilibrium**:



- Compared to the normal substrate, the extra  $\text{COO}^-$  group in analog 1 **destabilizes** (raises the free energy of) the **S-P** complex because of the charge repulsion, shifting the equilibrium to favor free S and P.
- Compared to the normal substrate, the addition of the polar N-H group (which can H-bond with water) in analog 3 **stabilizes** (lowers the free energy of) **free S** in solution, shifting the equilibrium to favor free S and P.