TABLE 4.2 Hydrated radii and hydration numbers of ions in water (approximate)

Ion	Bare ion radius (nm)	Hydrated radius (nm)	Hydration number (±1)	Lifetime (exchange rate) (s)
H_3O^+	—	0.28	3	—
Li^+	0.068	0.38	5–6	10^{-9}–10^{-8}
Na^+	0.095	0.36	4–5	10^{-9}
K^+	0.133	0.33	3–4	10^{-9}
Cs^+	0.169	0.33	1–2	10^{-10}–10^{-9}
Be^{2+}	0.031	0.46	4[a]	10^{-3}–10^{-2}
Mg^{2+}	0.065	0.43	6[a]	10^{-6}–10^{-5}
Ca^{2+}	0.099	0.41	6	10^{-8}
Al^{3+}	0.050	0.48	6[a]	10^{-1}–1
OH^-	0.176	0.30	3	
F^-	0.136	0.35	2	
Cl^-	0.181	0.33	1	
Br^-	0.195	0.33	1	
I^-	0.216	0.33	0	
NO_3^-	0.264	0.34	0	
$N(CH_3)_4^+$	0.347	0.37	0	

[a] Number of water molecules forming a stoichiometric complex with the ion (e.g., $[Be(H_2O)_4]^{2+}$). The hydration number gives the number of water molecules in the primary shell, though the total number of water molecules affected can be much larger and depends on the method of measurement. Similarly, the hydrated radius depends on how it is measured. Different methods can yield radii that can be as much as 0.1 nm smaller or larger than those shown. Table compiled from data given by Nightingale (1959), Amis (1975), Saluja (1976), Bockris and Reddy (1970), Cotton and Wilkinson (1980).