

Groundwater Hydrology Definitions

1. **groundwater** - water underground in the pore spaces and fractures of rocks and soils
2. **groundwater hydrology** - the study of the occurrence, distribution, movement, and chemistry of water in the subsurface
3. **water table** - the surface on which the fluid pressure in the pores of a porous medium is exactly equal to atmospheric pressure
4. **vadose zone** - subsurface region between the soil surface and the water table, also called **unsaturated zone**
5. **saturated zone** - subsurface region below the water table
6. **aquifer** - saturated unit capable of transmitting economic quantities of water
7. **aquitard** - saturated unit that transmits groundwater slowly, also called **confining layer**
8. **unconfined aquifer** - aquifer that is bounded above by the water table, also called **water table aquifer**, **phreatic aquifer**
9. **confined aquifer** - aquifer overlain by a unit that is significantly less permeable
10. **porosity**, n - ratio of volume of void space to total volume of rock
11. **representative elementary volume (REV)** - the smallest volume that has equivalent material properties as the whole
12. **specific yield**, S_y - ratio of volume of interconnected void space to total volume of rock, also called **effective porosity**, n_e
13. **specific retention**, S_r - ratio of volume of immobile water to the total volume of the porous medium
14. **volumetric water content**, θ - ratio of volume of water to total volume of rock, also called **moisture content** or **water content**
15. **piezometer** - open pipe installed in an aquifer to measure head at a point
16. **head**, h - energy per weight of water, also called **hydraulic head**, **total head**; equal to the height of water in a piezometer or open tube relative to the datum
17. **pressure head** - pressure potential energy per weight of water; equal to the height of water in a piezometer or open tube above the point of interest
18. **elevation head** - gravitational potential energy per weight of water; equal to the height of the point of interest above the datum
19. **capillary pressure** - difference between air pressure and water pressure in the vadose zone

20. **water retention curve** - relationship between water content and pressure head in the vadose zone, also called **soil water characteristic curve**
21. **capillary fringe** - region just above the water table where the porous medium is saturated but the pressure is below atmospheric, due to capillary rise
22. **hydraulic gradient**, dh/ds or ∇h - change in hydraulic head as a function of position
23. **piezometer nest** - several piezometers installed to different depths at essentially the same location; used to determine vertical flow direction
24. **potentiometric surface** - surface that represents the level to which water will rise in a piezometer
25. **hydraulic conductivity**, K - property of the porous medium and fluid describing the ability of the porous medium to transmit fluid
26. **specific discharge**, \vec{q} - ratio of flow rate to cross-sectional area perpendicular to flow, also called **Darcy velocity**
27. **mobile porosity**, n_m - ratio of volume of mobile water to total aquifer volume
28. **groundwater velocity**, \vec{v} - average velocity of groundwater molecules; it is equivalent to the ratio of specific discharge to mobile porosity, also called **average linear velocity**, **pore velocity**, **seepage velocity**
29. **permeability**, k - property of the rock describing the ability of the rock to transmit fluid, also called **intrinsic permeability**
30. **homogeneous** - property values do not depend on location
31. **heterogeneous** - property values depend on location
32. **streamline** - path that is everywhere tangent to the groundwater velocity
33. **isotropic** - property values do not depend on direction
34. **anisotropic** - property values depend on direction
35. **relative hydraulic conductivity** - ratio of hydraulic conductivity of an unsaturated soil to the hydraulic conductivity of the same soil when saturated
36. **slug test** - field test used to determine aquifer properties by observing the aquifer response to adding or removing a volume of water from a monitoring well
37. **drawdown**, s or δ - drop in hydraulic head relative to its initial position
38. **compressibility**, α - change in pore volume of aquifer per unit change in pressure
39. **water compressibility**, β - change in volume of water per unit change in pressure per unit volume of fluid

- 40. **specific storage**, S_s - volume of water released from a unit volume of aquifer under a unit decline in hydraulic head
- 41. **storage coefficient**, S - volume of water released from a unit area of aquifer under a unit decline in hydraulic head ($S = S_s b$, where b is the aquifer thickness), also called **storativity**
- 42. **transmissivity**, T - property describing the ability of an aquifer to transmit water ($T = Kb$, where b is the aquifer thickness)
- 43. **well hydraulics** - study of the behavior of an aquifer under the stress caused by injection or extraction of fluids through wells
- 44. **cone of depression** - region around a pumping well where drawdown occurs
- 45. **pumping test** - field test used to determine aquifer properties by pumping water out of one well and observing drawdown in other wells
- 46. **capture zone** - region around a pumping well that contributes water to the well
- 47. **dipole** - an injection well and extraction well pair, with both wells operating at the same pumping rate
- 48. **advection** - transport of a solute with the bulk groundwater movement
- 49. **dispersion** - spreading of a solute due to unmodeled velocity variations
- 50. **molecular diffusion** - movement of a solute due to random molecular motion
- 51. **tortuosity**, τ - ratio of straight line path length of a solute to the actual path length
- 52. **sorption** - surface reaction between a solute and the rock matrix