

## 4. 부록(appendices)

### 4.1 다양한 암석별 수리전도도(Domenico and Schwartz, 1990)

Material	Hydraulic conductivity (m/sec)
<i>Sedimentary</i>	
Gravel	$3 \times 10^{-4} \sim 3 \times 10^{-2}$
Coarse sand	$9 \times 10^{-7} \sim 6 \times 10^{-3}$
Medium sand	$9 \times 10^{-7} \sim 5 \times 10^{-4}$
Fine sand	$2 \times 10^{-7} \sim 2 \times 10^{-4}$
Silt, loess	$1 \times 10^{-9} \sim 2 \times 10^{-5}$
Till	$1 \times 10^{-12} \sim 2 \times 10^{-6}$
Clay	$1 \times 10^{-11} \sim 4.7 \times 10^{-9}$
Unweathered marine clay	$8 \times 10^{-13} \sim 2 \times 10^{-9}$
<i>Sedimentary rocks</i>	
Karst and reef limestone	$1 \times 10^{-6} \sim 2 \times 10^{-2}$
Limestone, dolomite	$1 \times 10^{-9} \sim 6 \times 10^{-6}$
Sandstone	$3 \times 10^{-10} \sim 6 \times 10^{-6}$
Siltstone	$1 \times 10^{-11} \sim 1.4 \times 10^{-8}$
Salt	$1 \times 10^{-12} \sim 1 \times 10^{-10}$
Anhydrite	$4 \times 10^{-13} \sim 2 \times 10^{-8}$
Shale	$1 \times 10^{-13} \sim 2 \times 10^{-9}$
<i>Crystalline rocks</i>	
Permeable basalt	$4 \times 10^{-7} \sim 2 \times 10^{-2}$
Fractured igneous and metamorphic rock	$8 \times 10^{-9} \sim 3 \times 10^{-4}$
Weathered granite	$3.3 \times 10^{-6} \sim 5.2 \times 10^{-5}$
Weathered gabbro	$5.5 \times 10^{-7} \sim 3.8 \times 10^{-6}$
Basalt	$2 \times 10^{-11} \sim 4.2 \times 10^{-7}$
Unfractured igneous and metamorphic rocks	$3 \times 10^{-14} \sim 2 \times 10^{-10}$

**4.2 다양한 지질매체의 비저유계수(specific storage)** (Anderson and Woessner, 1992)

Material	Specific storage ( $S_s$ , $m^{-1}$ )
Plastic clay	$2.0 \times 10^{-2} \sim 2.6 \times 10^{-3}$
Stiff clay	$2.6 \times 10^{-3} \sim 1.3 \times 10^{-3}$
Medium-hard clay	$1.3 \times 10^{-3} \sim 9.2 \times 10^{-4}$
Loose sand	$1.0 \times 10^{-3} \sim 4.9 \times 10^{-4}$
Dense sand	$2.0 \times 10^{-4} \sim 1.3 \times 10^{-4}$
Dense sandy gravel	$1.0 \times 10^{-4} \sim 4.9 \times 10^{-5}$
Rock, fissured, jointed	$6.9 \times 10^{-5} \sim 3.3 \times 10^{-6}$
Rock, sound	Less than $3.3 \times 10^{-6}$

**4.3 다양한 지질매체의 대표적 비산출율(specific yield)** (Domenico and Schwartz, 1990)

Material	Specific yield*
Gravel, coarse	0.23
Gravel, medium	0.24
Gravel, fine	0.25
Sand, coarse	0.27
Sand, medium	0.28
Sand, fine	0.23
Silt	0.08
Clay	0.03
Sandstone, fine grained	0.21
Sandstone, medium grained	0.27
Limestone	0.14
Dune sand	0.38
Losses	0.18
Peat	0.44
Schist	0.26
Siltstone	0.12
Till	0.16
Tuff	0.21
Igneous, weathered	0.25

\* Averaged value

#### 4.4 각종지질매체의 공극율(Domenico and Schwartz, 1990)

Material	Porosity (%)
<i>Sedimentary</i>	
Gravel, coarse	24 ~ 36
Gravel, fine	25 ~ 38
Sand, coarse	31 ~ 46
Sand, fine	26 ~ 53
Silt	34 ~ 61
Clay	34 ~ 60
<i>Sedimentary rocks</i>	
Karst limestone	5 ~ 50
Limestone, dolomite	0 ~ 20
Sandstone	5 ~ 30
Siltstone	21 ~ 41
Shale	0 ~ 10
<i>Crystalline rocks</i>	
Fractured crystalline rocks	0 ~ 10
Dense crystalline rocks	0 ~ 5
Weathered granite	34 ~ 57
Weathered gabbro	42 ~ 45
Basalt	3 ~ 35

#### 4.5 Useful Unit Conversions

1 darcy	$9.664 \times 10^{-6}$ m/sec	
1 US gallon	3.785 L	
1 foot	0.3048 m	
1 inch	0.0254 m	
1 bar	$10^5$ hPa	1019.7 cm of water at 4°C
1 atm	1013.25 hPa	760 mm Hg

#### 4.6 참고문헌

- Anderson, M.P., and Woessner, W. W., 1992, *Applied Groundwater Modeling, Simulation of Flow and Advective Transport*, pp. 41, Academic Press Inc., San Diego, California.
- Domenico, P. A. and F. W. Schwartz, 1990, *Physical and Chemical Hydrogeology*, pp. 26, 65, 118, John Wiley & Sons, Inc., New York.

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