

YILDIZ TECHNICAL UNIVERSITY – DEPARTMENT OF ARCHITECTURE
2017 -2018 ACADEMIC YEAR – SPRING SEMESTER
BUILDING MATERIALS LECTURE NOTES / Dr. Polat DARÇIN

AGGREGATES

Aggregate is a broad category of coarse particulate matter, basically used as filler with binding material in the production of mortar and concrete or in drainage applications. They can be derived from nature or can be manufactured.

According to the size of the particles, aggregates retained on 4,75 mm sieve are identified as coarse and aggregates passing through 4,75 mm sieve are defined as fine.



Shape of the particles can be



round: poor bonding with binders



angular: sharp, angular and flaky rough particles, providing very good bonds with binders



crushed stone (angular rock)

typically produced by mining a suitable rock deposit and breaking the removed rock down to desired size using crushers (no 1: 3 – 15 mm; no 2: 7 – 15 mm; no 3: 15 – 30 mm).



20 mm crushed stone

gravel

is composed of unconsolidated rock fragments that have a general particle size (fine gravel: 6,35 – 15 mm; medium gravel: 15 – 30 mm; coarse gravel: 30 – 100 mm). Gravel is formed by natural processes of weathering and erosion and typically has a more rounded shape than crushed stone.



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sand

is a naturally occurring granular material composed of finely divided rock and mineral particles. It is defined by size, being finer than gravel and coarser than silt (fine sand: 0,075 mm – 0,18 mm; medium sand: 0,18 – 0,85 mm; coarse sand: 0,85 – 6,35 mm). The composition of sand varies, depending on the local rock sources and conditions, but the most common constituent of sand in inland continental settings and non-tropical coastal settings is silica (silicon dioxide), second most common type is calcium carbonate.



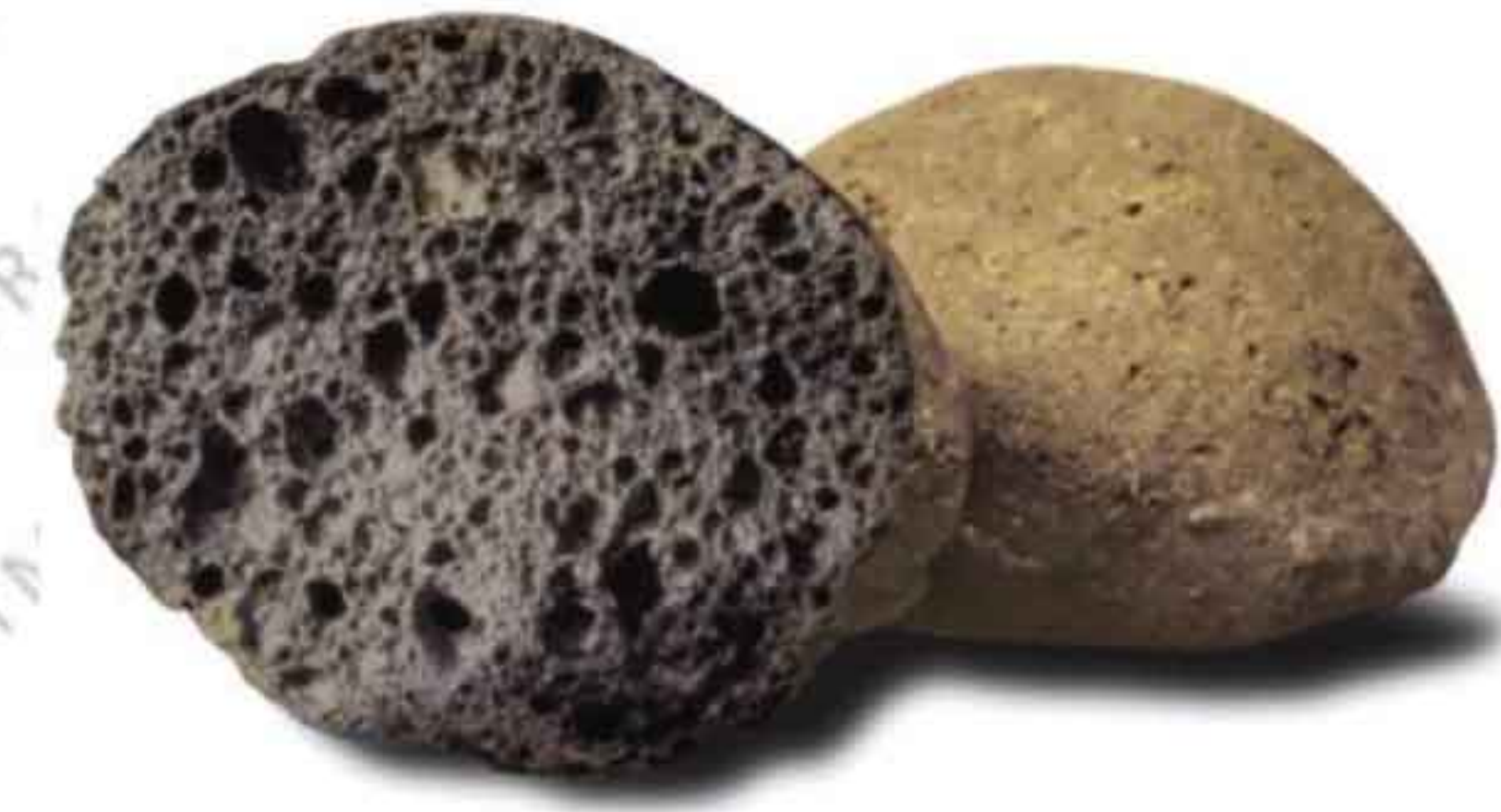
pumice

is a volcanic rock that consists of highly vesicular rough textured volcanic glass, which may or may not contain crystals.



expanded clay

is a lightweight aggregate made by heating clay around 1,200 °C in a rotary kiln. The yielding gases expand the clay by thousands of small bubbles forming during heating producing a honeycomb structure.



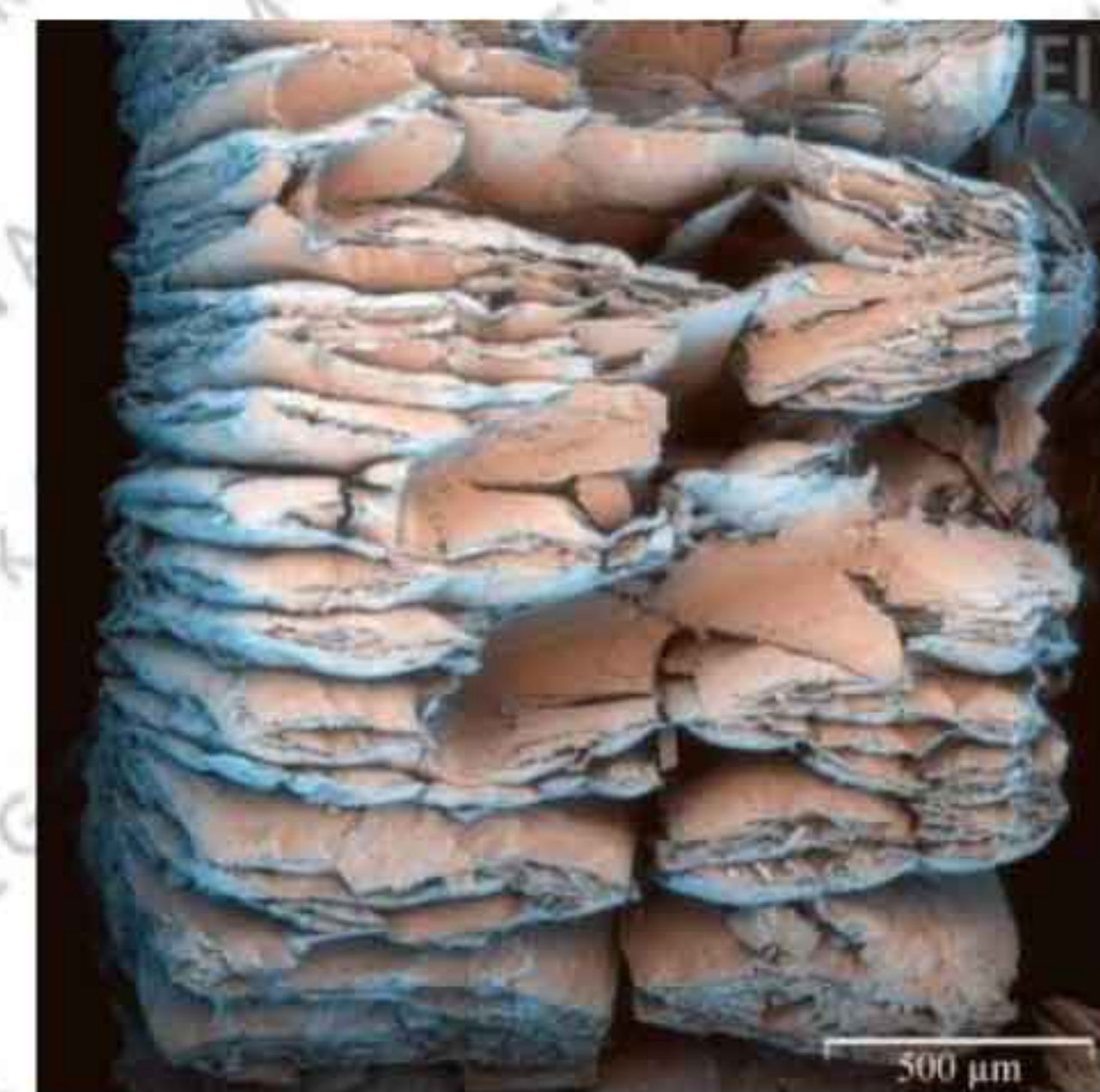
expanded perlite

Perlite is an amorphous volcanic glass that has a relatively high water content, typically formed by the hydration of obsidian. It occurs naturally and has the unusual property of greatly expanding when heated sufficiently.



expanded vermiculite

Vermiculite is a hydrous phyllosilicate mineral. It undergoes significant expansion when heated. Exfoliation occurs when the mineral is heated sufficiently.



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**blast
furnace slag
(cüruf)**

is obtained by quenching molten iron slag (a byproduct of iron and steel making) from a blast furnace in water or steam, to produce a glassy, granular product. It can then dried and ground into smaller particles. The composition of a slag varies considerably depending on the composition of the raw materials in the iron production process.



fly ash

is one of the coal combustion products, composed of the fine particles that are driven out of the boiler with the flue gases. Ash that falls in the bottom of the boiler is called bottom ash. Together with the bottom ash, it is known as coal ash. Depending upon the source and makeup of the coal being burned, the components of fly ash vary considerably, but all fly ash includes substantial amounts of silicone dioxide, aluminum oxide and calcium oxide.



**expanded
polystyrene**

is a rigid and tough, closed cell foam.



**recycled
products**

When buildings are demolished, recycling building products is an increasingly common method with a number of benefits that have made it a more attractive option in this age of greater environmental awareness, more environmental laws and the desire to keep construction costs down. Some products made of clay, concrete, etc. are collected from demolition sites and crushed into certain sized particles to make proper aggregates.

**broken
bricks
(brickbats)**



**recycled
concrete**

