cttp
Center for Training
Transportation Professionals

# Basic Aggregates Study Guide

## General Conversions

1) There are _____ pounds in one ton.
2) There are _____ grams in one pound.
3) One kilogram consists of _____ grams.
4) The linear distance that one station covers is _____ feet.

## Terminology

5) The temperature used to **oven** dry aggregates is _____ ± _____ ° F or _____ ± _____° C.
6) When a material has been "air dried", the material has been partially dried at a temperature of no more than _____ ° F or _____ °C.
7) Constant mass is defined as the mass at which additional drying would result in less than _____ % additional loss in mass.
8) The % passing plus the % retained for any individual sieve must equal _____ %.
9) The maximum aggregate size (MAS) is the _____ sieve that 100% of the material is _____ to pass.
10) The nominal maximum aggregate size (NMAS) is the _____ sieve which 100% of the material is _____ to pass.
11) A coarse aggregate will typically have most of the particles _____ on the # _____ sieve while a fine aggregate will usually have most of the particles _____ the # _____ sieve.

## Sampling

12) Unlined open weave mesh bags should be used for sampling aggregates.
    True False
13) The most important thing to remember when sampling is to obtain a _____ sample.
14) _____ is the separation of materials into an unblended state.

15) When sampling from a stockpile, you must obtain your composite sample from at least _____ locations from the created pile.

16) When using a sampling tube on fine aggregates, you must obtain portions from _____ different locations.

17) You must sample from a minimum of _____ location(s) when sampling from a conveyor belt.

18) When collecting samples from a flowing stream of material, it is not permissible to collect the sample from only a portion of the stream width or to allow the sampling container to overflow with aggregate. True False

19) When sampling from a transportation unit, divide the unit into _____ _____ and obtain a sample portion from _____ quadrant.

20) After sampling at all locations, you must _____ all samples prior to reduction.

**Reducing Samples**

21) A mechanical splitter should have at least _____ openings for coarse aggregates and _____ openings for fine aggregates and have an _____ number of openings on each side.

22) The opening size for a mechanical splitter must be at least _____ % larger than the largest particle size.

23) When quartering, you must turn over the pile a minimum of _____ times to thoroughly mix the pile and then flatten the pile so that the diameter of the pile is _____ to _____ times the thickness of the pile.

24) When quartering, you must retain _____opposite quarters for your reduced sample.

25) You must obtain samples from at least _____ locations when using the miniature stockpile method of reduction.

## % Passing # 200 by Washing

26) AASHTO T 11 is used to determine the amount of material finer than the _____ sieve by washing.

27) Another term used to describe the % loss due to washing is _____ loss.

28) The wash screen must be protected by a _____ to a _____cover sieve.

29) The sieve and cover sieve should be inspected for cleanliness and serviceability prior to the washing process. True False

30) Prior to starting the washing of the sample, the sample must have been _____ to a constant mass, cooled and _____.

31) When agitating the sample covered in water, you may remove any tools used in the agitation process without rinsing them over the wash pan.
True False

32) While pouring the wash water over the nested sieves, it is permissible to transfer all the aggregate to the cover sieve. True False

33) You must continue the washing process until the wash water is _____.

34) When finished with the washing process, it is allowable to leave materials in the wash sieves. True False

35) After transferring all materials to the wash pan, if there is an excess of water in the pan, it is permissible to pour the water directly down the sink. True False

## Sieve Analysis

36) Prior to beginning a sieve analysis, the field sample must be reduced, _____ to a constant mass, cooled, and _____.

37) Overloading of sieves may cause inaccurate results. True False

38) An overloaded sieve will typically have more than _____ layer of aggregate on the sieving surface after sieving.

39) You can prevent the overloading of sieves by inserting _____ sieves, using _____ (frame) sieves, or by _____ the sample into smaller portions before sieving.

40) When stacking a set of sieves, the _____ sized openings go on top and progressively get _____ as the bottom of the stack is approached.

41) The sieving process may be accomplished by _____ sieving or by the use of a _____ shaker.

42) Sieving should continue until less than _____ % by mass of the total sample passes any sieve during _____ minute(s) of continuous hand sieving.

43) It is permissible to force materials through a sieve by hand. True False

44) In checking the accuracy of the sieving process, the weight before sieving, and the cumulative weight after sieving should not differ by more than _____ % if the results are to be used for _____ purposes.

45) For all sieves except the # 200 sieve, report the % passing to the nearest _____ number.

46) For the # 200 sieve, report the % passing to the nearest _____ % if the value is 10 or more and to the nearest _____ % if the value is less than 10.

47) The values for fineness modulus and dust ratio are reported to the nearest _____.

**Organic Impurities**

48) This test is used to determine the presence of _____ organic compounds.

49) When a sample subjected to this test produces a color _____ than the standard color, it is advisable to perform the test for the _____ of organic impurities on the _____ of mortar.

50) Bottles are permitted to be light in color. True False

51) The Organic Color Plate # _____ corresponds to the Gardner Color Standard # 11 which is used as the color standard for this test.

52) The field sample should be reduced to approximately a _____ pound test sample.

53) When preparing a sample for organic impurities testing, you should never _____ dry the sample.

54) After placing the fine aggregate in the bottle to the _____ mL or _____ oz. mark, a _____ % sodium hydroxide solution is added to fill the bottle to the _____ mL or _____ oz. mark.

55) After filling the bottle with sodium hydroxide solution, the bottle is sealed, _____ and allowed to stand undisturbed for _____ hours.

56) After the required standing time, the solution in the test bottle is compared to either a standard color _____ or _____.

57) If a standard color chart is used for comparison, the plate _____ of the color _____ to the liquid color is recorded.

**Moisture Content**

58) Moisture content is the percentage of _____ moisture in aggregates based on the dry weight of aggregate.

59) When drying a moisture sample, the depth of the sample in the container shall not be greater than _____ of the smallest lateral dimension.

60) Alternate sources of heat are permissible as long as caution is exercised to prevent degradation or loss due to exploding aggregates. True False

61) Stirring of aggregates while drying using a heat source other than an oven _____ drying and prevents _____ heating.

62) After obtaining the _____ weight of the sample, you must dry the sample to a _____ mass at a temperature of _____° F, cool the sample, and record the _____ weight.

63) Report moisture content to the nearest _____ %.

**Coarse Aggregate Specific Gravity**

64) Absorption is the increase in the _____ of the rock due to the _____ water in the _____ of the rock.

65) The wire mesh basket used for weighing below water should have # _____ size or smaller openings to prevent loss of aggregate.

66) The water bath should be maintained at _____ ± _____° F and be equipped with an _____ to maintain a constant water level.

67) When preparing a field sample for coarse aggregate SpG, the field sample must be mixed and _____, oven _____ to a constant mass, _____ and sieved over a # _____ screen. The sample is then washed to remove _____ coatings, covered with water and allowed to soak for _____ to _____ hours.

68) Values for absorption and bulk specific gravity (SSD) may be significantly higher for aggregate not dried before soaking. True False

69) After reaching SSD condition, it is permissible to wait for a while before obtaining the SSD weight of the aggregate in air. True False

70) Prior to submerging a sample in the water bath, the water level should be filled to overflowing and allowed to stabilize before zeroing out the basket in the water bath. True False

71) When submerging a sample in the water bath, you should _____ the basket to help prevent trapped air from causing an error in the test.

72) After obtaining the submerged weight of the aggregate, the aggregate must be dried at _____ ° F to a _____ mass, cooled, and then weighed.

73) The three weights needed to compute a coarse aggregate bulk specific gravity are the _____ weight, the _____ weight, and the _____weight.

**Fine Aggregate Specific Gravity**

74) Scales which read to the nearest _____ gram must be used in this test.

75) In preparation of the aggregate for a fine aggregate specific gravity test, the field sample must be mixed and reduced to test size, _____ dried to a constant mass, sieved over a # _____ sieve, and soaked for _____ to _____ hours.

76) The fine aggregate sample must be washed prior to soaking. True False

77) A fine aggregate sample may be totally _____ in water or have a minimum of _____ % water added to the sample to saturate the aggregate.

78) The approximate test sample size to obtain when running a fine aggregate specific gravity test is _____ grams.

79) In the calibration of the pycnometer, the pycnometer must be filled with water at _____ ± _____° F, by bringing the _____ of the _____ to the calibration mark.

80) The _____ test is used to determine when the aggregate reaches the SSD condition during a fine aggregate specific gravity test.

81) The first trial of the cone test must indicate that there is _____ present on the surface of the fine aggregate; if not, you must add water to the sample and permit the sample to stand covered in a container for _____ minutes.

82) To perform a cone test, you must fill the cone to _____ with aggregate, tamp the aggregate with _____ drops from a height of _____ inches above the aggregate surface, clear aggregate from around the _____, then vertically lift the cone and see what happens.

83) If the fine aggregate retains the molded shape after a cone test, then the sample's moisture status is _____ SSD condition.

84) If the fine aggregate flattens out of shape during a cone test, the aggregate is at SSD condition. True False

85) When a material is at the SSD condition, the molded form should _____ slightly when removing the cone.

86) After reaching SSD condition, the amount of SSD aggregate added to the pycnometer should be _____ ± _____ grams.

87) If using a companion sample to determine the dry weight of aggregate, it is permissible to obtain the sample when finished with the test. True False

88) If using a companion sample, its' weight must be within ± _____ grams of the _____ weight.

89) After the addition of the SSD aggregate to the pycnometer, you must fill the pycnometer with water to approximately _____ % of its capacity.

90) Rolling, inverting, and agitation of the pycnometer _____ the trapped _____ .

91) After de-airing the sample, the pycnometer is brought to the proper temperature, filled to the calibration mark with water and _____.

92) To determine the dry weight of the aggregate, you may use the sample from the pycnometer, or use a companion sample. True False

93) The four weights needed for a fine aggregate specific gravity test are, the weight of the pycnometer filled with _____, the _____ weight of the aggregate, the weight of the (_____ + _____ + _____), and the _____ weight of the aggregate.

94) Abbreviations are used as shorthand in specifying types of specific gravities. _____ is used for bulk specific gravity, _____ is used for apparent specific gravity, and _____ is used for bulk specific gravity (SSD).

95) In the formulas for computing specific gravity and absorption values for coarse aggregates, _____ stands for the dry weight, _____ stands for the SSD weight, and _____ stands for the submerged weight.

96) Specific gravity values are reported to the nearest _____, and absorption values are reported to the nearest _____ %.

97) The value obtained from the combining of multiple specific gravity values should fall between the _____ and the _____ individual specific gravity values used.

## % Crushed Particles

98) The sample must be dried to a constant mass before testing. True False

99) The test for crushed particles is run on the _____ fraction of the aggregate.

100) You must visually separate the particles into two piles of _____ and _____ pieces.

101) When determining the % of crushed particles, weigh the _____ pieces and divide by the sample weight, then multiply by 100.

102) Report % crushed particles to the nearest _____ %

## % Deleterious Matter

103) Deleterious materials are anything which may be _____ to the _____ products.

104) Common deleterious materials include _____ lumps, _____ or _____, and _____ particles.

105) When separating out the coarse particles over the # 4 sieve, it is permissible to break up any clay lumps found. True False

106) A non-glazed _____ plate may be helpful in determining if there is shale or slate present in the sample.

107) You must dry the sample to constant mass before testing. True False

108) The test is run by visually _____ the particles into groups of deleterious and non-deleterious particles.

109) Report the % deleterious materials to the nearest _____ %.

## Specifications

110) To find all specifications and revisions for an ARDOT job, a quality control technician should reference the _____ specifications, _____ specifications, _____ provisions, and the job _____.