Atmospheric Pollution and Climate Change

1) **Which factors contribute to sea level rise due to climate change?**
   a) Increased numbers of floods
   b) Rapid melting of arctic ice
   c) Thermal expansion and melting of land-bound ice
   d) Slow sinking of the continents
   e) Enhanced precipitation

2) **The green house gas effect can be explained by**
   a) Wavelength dependence of absorption of radiation by GHG
   b) Ozone depletion in the stratosphere
   c) The elliptic path of the earth around the sun
   d) Enhanced reflection of long wave radiation by GHG
   e) Enhanced concentration of dust and carbon monoxide in the atmosphere

3) **Because saturation vapour pressure depends on the surface on which it occurs**
   a) Lifting of air masses leads to condensation
   b) Clouds grow rapidly when ice particles are introduced
   c) Small drops grow at the cost of large drops
   d) Mixing of warmer and colder air masses can lead to mixing fog

4) **Airborne radionuclide concentrations are especially relevant for**
   a) Infiltration and Submersion
   b) Ingestion and Inhalation
   c) Ingestion and Submersion
   d) Inhalation and Submersion
   e) Exposition and Ingestion

5) **Occult deposition is**
   a) An as yet undiscovered deposition
   b) Deposition that is not yet fully understood
   c) Deposition by fog, dew, etc.
   d) Deposition pollutants attached to aerosols

6) **For the development of the ozone hole in the Antarctic the following are decisive**:
   a) High CFC concentrations an lack of solar radiation
   b) High CFC concentrations and temperatures below zero
   c) High CFC concentration and climate change
   d) Temperatures below -80°C and little air mass exchange

7) **The double strategy in Austrian air pollution policy consists of**
   a) Limiting synergistic pollutants simultaneously
   b) Requiring the pollutants and the affected to contribute to emission reductions
   c) Increasing stack heights and emission standards
   d) Limiting emission according to state-of-the-art technology and to stay within air quality

8) An end-of-pipe measure is e.g.:
   a) Using more efficient technologies
   b) Implementing an emission trading scheme
   c) Filter flue gases
   d) Technological improvements in the process
   e) Desulfurization of oil

9) Present day GHG emissions of the average Austrian are around
   a) 50 t per year
   b) 1 t per year
   c) 100 t per year
   d) Not quantifiable
   e) 10 t per year

10) Climate change does not involve:
   a) Changes in precipitation
   b) Frequency of extreme events
   c) More intense earthquakes
   d) Melting of polar ice
   e) Temperature changes

11) Which are not typical effects of mountain valleys or basins?
   a) Inducing thermally driven circulations
   b) Strong dispersion of pollutants
   c) Development of cold air basins due to drainage flow
   d) Inversions
   e) Channelling flow

12) Stratospheric ozone concentration
   a) Is falling in midlatitudes in winter, constant in summer
   b) Is falling worldwide
   c) Is falling in equatorial regions in winter
   d) Is falling in midlatitudes, and strongly falling over Antarctica

13) In the climate debate tipping points are understood to describe
   a) Points at which the planet becomes uninhabitable
   b) Points beyond which positive feedback mechanisms can no longer be contained by humans
   c) Points of time in policy debate when decisive steps are taken
   d) Geographical locations where decisive climate process

14) Under clear sky conditions in summer ozone levels are especially high in Vienna
   a) On weekdays
   b) During traffic peaks
   c) On Sundays and holidays
   d) On Mondays
   e) On Saturdays
   f) In the early morning

15) What is NOT true of radioactive decay
   a) Is the only way to deplete radio nuclei
   b) Disappears after 5 half-life times
   c) Depends only on the radio nuclide
   d) Is independent of external influences
   e) Can vary over several orders of magnitude

16) Which of the following issues is not a mesoscale pollution problem
   a) Fine particles (PM)
   b) Tropospheric zone
   c) Persistent organic compounds (POP)
   d) Green house gases
   e) Radio active substances

17) The IPAT equation or Kaya Identity can be used to explain
   a) The impact of population, air pollution and technology on environmental degradation
   b) The impact of green house gas emissions on climate
   c) The extent to which ecological boundaries have been crossed
   d) The impact of world population, affluence and technology on green house gas emissions
   e) The impact of lifestyles on environmental quality and tipping points

18) What was the original definition of smog?
   a) A combination of smoke and fog
   b) High concentrations of photo chemicals
   c) Cigarette smoke
   d) High ozone concentrations

19) Dispersion models typically consist of 3 modules:
   a) Transport Module, Immission Module, Impact Module
   b) Meteorology Module, Chemistry Module, Deposition Module
   c) Emission Module, Transmission Module, Immission Module
   d) Meteorology Module, Chemistry Module and Transport Module
   e) Meteorology Module, Transport Module, Deposition Module

20) Trajectories are an important part of which kind of dispersion models?
   a) Gaussian models
   b) Diffusions models
   c) Langrangian models
   d) Richardson models
   e) Eulerian models

21) Near the earths surface temperature increases with height
   a) When wind speed increases with height
   b) When wind speed is low and the radiation balances at the surface is negative
   c) Because the distance from sun decreases
   d) When atmospheric radiation exceeds terrestrial radiation
   e) When warm air rises from heated surfaces
   f) When an inversion breaks up

22) Chronic damage caused by air pollution can be prevented
   a) Standards expressed in high percentiles
   b) Limiting maximum concentration
   c) Short term standards, e.g. hourly means
   d) Long term standards, e.g. yearly means

23) In an idealised valley the following local circulations are to be expected in fair weather on the early afternoon
   a) only valley wind
   b) valley- and down slope wind
   c) valley and up slope wind
   d) only down slope wind
   e) Mountain and down slope wind

24) In order for a cloud to rain, cloud droplets must grow
   a) through coagulation and coalescence with other droplets
   b) through freezing and melting
   c) and reach a size 100 times that a small cloud droplet
   d) through transpiration and evaporation
   e) through compression and density increase
   f) through condensation and diffusion

25) Which of the following radiative processes leads to energy conversion?
   a) Reflexion
   b) Absorption
   c) Refraction
   d) Diffusion

26) Concentrations caused at a specific point by a continuous point source vary strongly
   a) in inversions
   b) in unstable layers
   c) in neutral layers
   d) in stable layers under strong wind conditions
   e) in isothermal layers near the ground

27) The troposphere
   a) is the bottom layer of the atmosphere in which temperature decreases with height
   b) is the lower part of the planetary boundary layer
   c) is the lower part of the stratosphere and characterized by temperature increase with height
   d) consists of the planetary boundary layer and the turbulent surface layer

28) Boundaries of the global ecological system seem to have been exceeded regarding
   a) climate change, nitrogen cycle and phosphorus cycle
   b) nitrogen cycle , phosphorus cycle and biodiversity loss
   c) ocean acidification, nitrogen cycle and biodiversity loss
   d) climate change, nitrogen cycle and biodiversity loss
   e) climate change, ocean acidification and biodiversity loss

29) The following is NOT correct regarding albedo:
   a) Averaged over the whole globe, albedo is about 5%
   b) Albedo is higher for snow than for bitumen
   c) Albedo is reflectivity averaged over all wave lengths
   d) Albedo is the ration of reflected to incoming radiation
   e) Albedo increases with the temperature of the reflecting body

30) The atmosphere is characterised by
   a) about 80% nitrogen, 20% oxygen and 1% Argon content
   b) about 0,03 CO_2 and 0,05 water vapour content
   c) about 80% oxygen and 20% hydrogen content near the surface
   d) rapid increase of CO_2 and decrease of oxygen concentrations
   e) good mixing of gases up to 120km height

31) Which of the following does not heat up faster than global average?
   a) Continents
   b) Arctic
   c) Alpine region
   d) Oceans

32) In what latitudes do the highest stratospheric ozone concentrations occur?
   a) 20°
   b) 60°
   c) 80°
   d) 45°

33) The declared aim of the policy of high stacks was to
   a) Enhance the chimney effect and create higher effective stack heights
   b) Make use of higher wind speeds
   c) Reduce maximum immissions on the ground
   d) Delay deposition
   e) Distribute pollutants over larger areas

34) Global temperature increase over the last 150 years is about
   a) 0,2°C
   b) 1,2°C
   c) 0,8°C
   d) 0,4°C

35) What process is not part of dispersion of pollutants in air?
   a) Interception
   b) Diffusion
   c) Decay
   d) Deposition
   e) Sedimentation

36) Clinical studies to determine concentration limits for humans help to
   a) Replace experiments using animals
   b) Study exposures under normal conditions
   c) Understand systematic dose-effect relationships
   d) Study the effects of high exposures

37) What is characteristic of an Eulerian model?
   a) The limited amount of input data and numerical capacity needed
   b) A coordinate system that is fixed relative to the earth surface
   c) The good representation of point sources
   d) A grid with increasingly smaller dimensions

38) What is the dual role of CFCs in the atmosphere?
   a) Enhance chemical reactions and produce stratospheric ozone
   b) Enhance chemical reactions and destroy tropospheric ozone
   c) Contribute to global warming as GHG and deplete ozone
   d) Destroy ozone and contribute to Global Dimming

39) Inversions can cause high immission concentrations near the ground
   a) When pollutants are emitted below the inversion
   b) Because heating is especially intense in these periods
   c) When pollutants are emitted into the inversion through high stacks
   d) Because pollutants are pressed downward

40) Sulfates can cover large distances in the atmosphere because
   a) They are released in great heights
   b) They are not easily washed-out
   c) Their lifetime in the atmosphere is long
   d) They are especially light compared to their size

41) What data are not relevant for emission inventories?
   a) Geographical position of sources
   b) Flue gas temperature
   c) Stack height
   d) Wind speed
   e) Emission rates of different pollutant groups

42) What human impact does not (yet) exceed the resilience boundaries of the global ecosystems?
   a) Climate change
   b) Biodiversity loss
   c) Acidification of the ocean
   d) Nitrogen cycle

43) Gaussian models for continuous point sources assume that
   a) Emissions occur at least 10 m above ground
   b) Life time of pollutants is limited
   c) Wind speed exceeds 1 m/s
   d) Pollutant concentration is uniform within the plume

44) Stratospheric ozone concentration
   a) Is falling in midlatitudes in winter, constant in summer
   b) Is falling worldwide
   c) Is falling in midlatitudes, and strongly falling over Antarctica
   d) Is falling in equatorial regions in winter

45) What part of the solar spectrum is primarily responsible for the cancer in human skin?
   a) UVA
   b) UVC
   c) Roentgen waves
   d) UVB
   e) Infra-red

46) Protections regarding climate in the future do not rely on:
   a) Assumptions on GHG emissions
   b) An understanding of radiation
   c) Assumptions on the development of the world population
   d) Mathematical models to simulate physical processes in the atmosphere
   e) Statistical extrapolations of the climate change of the past

47) Air flow is influenced near buildings
   a) But the induced turbulence is irrelevant for dispersion
   b) Up to about 150 m behind the building
   c) The stronger, the smaller the building is
   d) In the vertical within about 2,5 times the height of the building

48) Which is no Green House Gas (GHG)?
   a) Carbon monoxide
   b) Carbon dioxide
   c) Water vapour
   d) Methane
   e) Ozone

49) What feedback mechanism is reinforcing (=positive)?
a) Increase in CO2, increased biomass, increased evaporation, cooling
b) Temperature decrease, more glaciers, higher Albedo
c) Temperature increase, increased evaporation, increased cloud cover
d) Temperature increase, forest fires, increased albedo

50) Deposition reaches generally its highest values
a) Chemical transformation
b) Occult deposition
c) Sedimentation
d) Wet deposition

51) Emission reductions necessary to meet the 2°C goal are consistent with
a) 80% reduction in industrialized and unlimited emissions in other nations
b) 50% reduction of GHG emissions in industrialized nations
c) Full use of conventional and unconventional reserves
d) About 1t of CO2 per person and year till 2050 in industrialized nations
e) GHG emissions about three times the amount already emitted

52) Which is a secondary pollutant?
a) Aerosols
b) Sulfur dioxide
c) Carbon monoxide
d) Nitrogen oxide
e) Ozone

53) Expected temperature increase in Austria in the next 20-50 years is about
a) 2-4°
b) 0,5-1°
c) 4-6°
d) 5-10°

54) Which is NOT a component of the radiation balance at the earth's surface?
a) diffuse or sky radiation
b) atmospheric radiation
c) celestial radiation
d) terrestrial radiation
e) direct solar radiation

55) The effective source height
a) is defined as the sum of stack height and plume rise
b) depends on the emitted pollutants
c) is equal to stack height for hot effluents
d) is near 40 km for stratospheric ozone
e) increases with air temperature

56) Climate change is scientifically proved by
… increase of global mean temperature

57) What is the significance of oceans in the global carbon cycle?
… a sink, but may become a source

58) What is not part of geo-engineering?
… substitution of fossil energy sources

59) Which of the following pollutants are GHGs?
… ozone, carbon dioxide, methane, water vapour (sind alle GHGs)

60) Radiation balance is clearly negative
… day time, inversion, rainfall?

So sieht der Test aus…
single choice

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